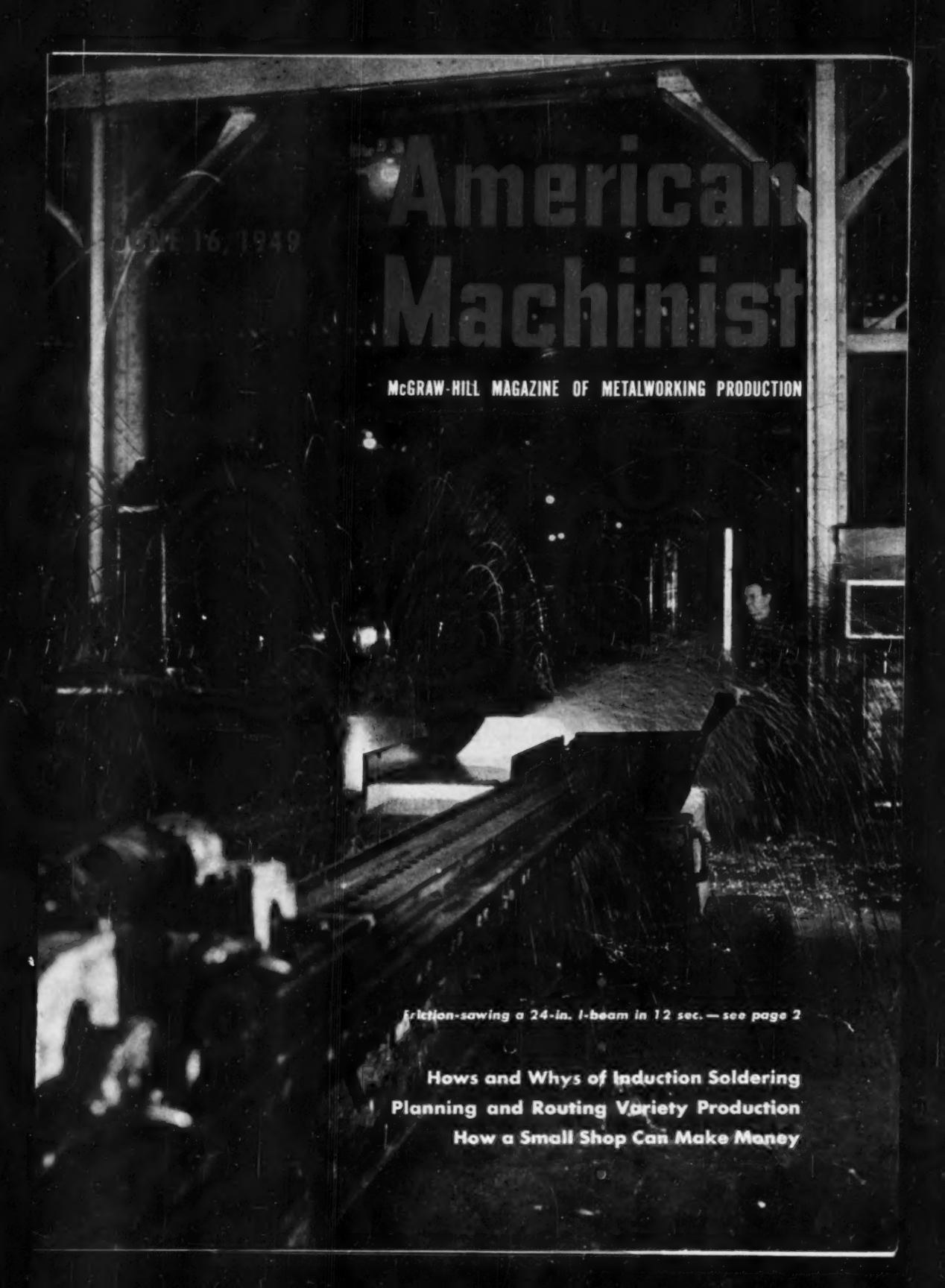
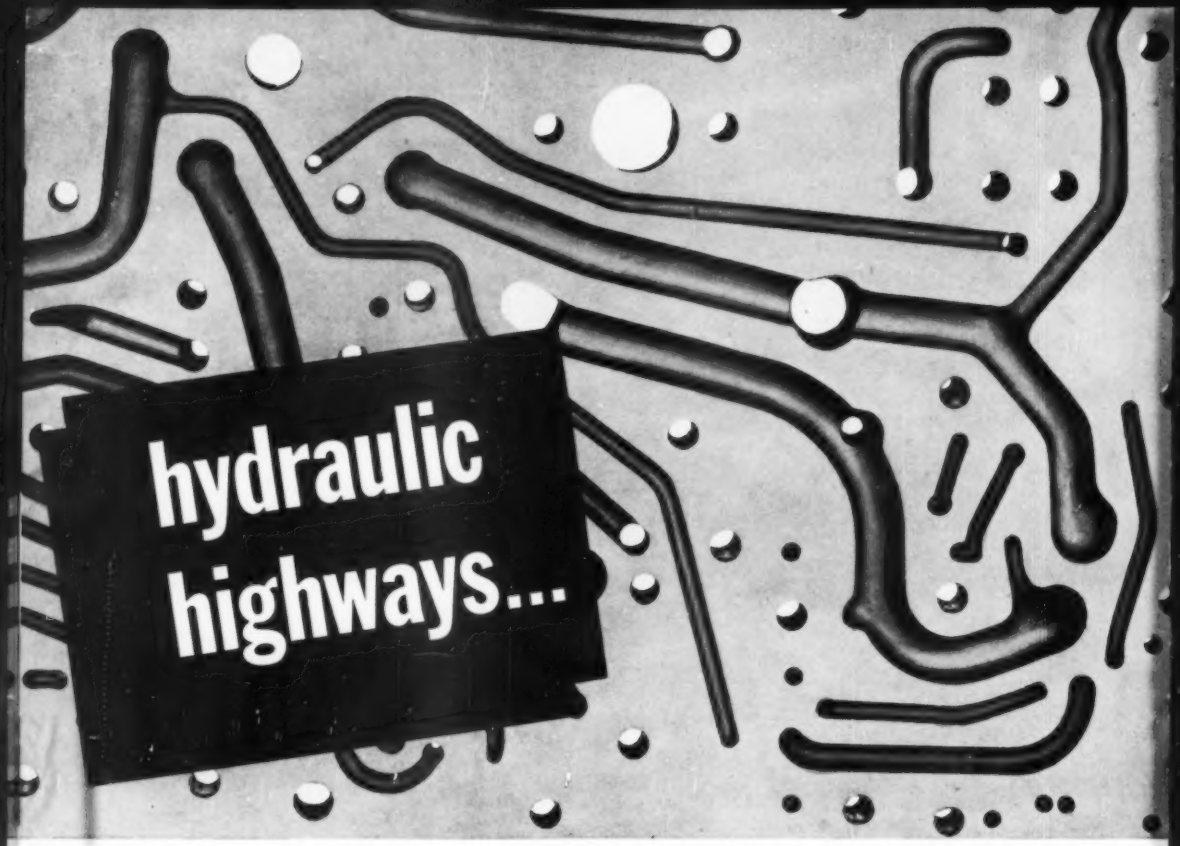


American Machinist

McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION

Friction-sawing a 24-in. I-beam in 12 sec. — *see page 2*

Hows and Whys of Induction Soldering
Planning and Routing Variety Production
How a Small Shop Can Make Money



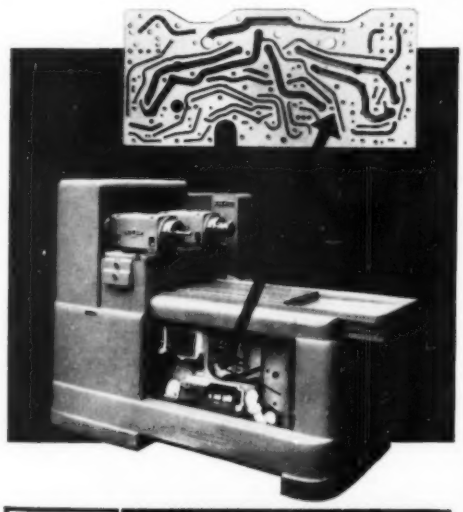
The manifold transfer plate controls flow of oil for various Heald machine cycle operations. Application of this exclusive feature eliminates yards of troublesome piping.

...that give you faster, non-stop production on the New Heald Machines

Through this intricate pattern of cored-out steel passages, flows the hydraulic fluid that controls the high-speed, automatic cycles of a Heald machine. For this is a close-up view of the Heald manifold transfer plate—an exclusive feature that provides fast, faultless control of volume and direction, without a maze of complicated, troublesome, and costly piping.

The manifold plate is universal in construction—designed to accommodate a wide variety of valve units and combinations, for any number of different machine cycle operations. And this is but one of the many new Heald features that add up to greater production, higher precision, and lower maintenance.

Your nearest Heald representative will be glad to give you the complete story—to show you how the new Heald machines can improve your precision finishing operations.



THE HEALD MACHINE COMPANY
Worcester 6, Mass.
Branch Offices in Chicago • Cleveland • Dayton • Detroit Indianapolis • Lansing • New York

HEALD

PRECISION INTERNAL AND SURFACE GRINDERS

PRECISION BORE-MATIC FINISHING MACHINES

American Machinist

MAGAZINE OF METALWORKING PRODUCTION

CONTENTS for June 16, 1949 ..... VOL. 93, NO. 12

Cover.....*Operation pictured is described on page 2*

ADMINISTRATION

Editorial.....*Burnham Finney* 75
As the Twig is Bent.....*T. J. Haas* 82
Orders Keep the Small Shop Busy.....*H. S. Chandler* 86
How to Choose and Use Portable Tools—3.....*H. P. Bailey* 106
The Itch to Travel.....*Round Table* 110
Your Only Chance of Getting Ahead.....*J. H. McGraw, Jr.* 116
Transmission Troubles and the Church..... 160

SPECIAL REPORT

Your Money's Worth Out of Dial Indicators.....*I. A. Hunt* 93

ASSEMBLY

Hows and Whys of Induction Soldering.....*Frank Curtis* 77
How to Weld a Wheel..... 101
Dimpled Tubing Locates Itself for Soldering Job....*Henry George* 116

ENGINEERING

Simple Plan Controls Variety Production.....*C. D. Mackinnon* 88
It's Easy to Calculate Die Clearances.....*J. R. Paquin* 102

FINISHING

Two Ideas Improve Dip Tanks.....*R. B. Wolverhampton* 114

MATERIAL CUTTING, FORMING

Auto-Feed Loads Couplings into Chuck.....*George E. Fogarty* 92
Automatic Setup Turns Out Gear Blanks.....*Paul Bludau* 103
Short Cuts.....*A. H. Waychoff* 109
Diagnosis of Machining Troubles.....*(RBS)* 127
Chart for Number of Boring Cuts.....*(RBS)* 131

TOOLING

Pressless Dies Operate in Sequence.....*Cyril Bath* 85
Broaching Fixture Accommodates Six Parts.....*Elmer Neuman* 104
Ball-Supported Toolholder Follows Cam.....*William Holmes* 111
Steadyrest Jaws Located Before Stock Is Chucked....*H. W. Cutting* 111
Reverse Centers Locate Reamers for Regrinding..*Heinz Landauer* 112
Boring Bar Cuts Tapered Bore.....*Fred H. Lingenfelder* 112
Grooved Sine Plate Mounts Gage Blocks.....*Joseph Z. Madaras* 112
Chuck Chucks Chuck to Avoid Hoisting.....*Lowell F. Stull* 113
Double Fixture Holds Part for Grinding.....*Paul H. Winter* 113
Ancient Lathe Bores Big Work with Bed Extension.....*Carl Peck* 113
Shear Blade Ground on Power Table Saw.....*Bernard Levowich* 114
Adjustable Clamps Lock Range of Parts.....*Roger Isetts* 114
Block Centers Micrometer.....*Charles Shope* 114
Air-Feed Bypass Shuts Off Empty Screw Machine..*R. H. Armacost* 114
Differential Screws Aid Surface-Gage Accuracy....*Carl S. Frank* 115
Home-made Micrometer Checks Inside and Outside....*Rex Smith* 115
Drilling Jig Improves Accuracy.....*Allan B. Nixon* 115
Stepped Block Aids Layout.....*Howard H. Petre* 116
Eccentric Stop Locates Work.....*Roger Isetts* 116

NEWS OF METALWORKING

Spot News..... 71
Gaging Metalworking..... 72
Business Items..... 177
Detroit News..... 122
Names in the News..... 123

DEPARTMENTS

Reference Book Sheets..... 127
Talking Shop..... 133
Equipment, Materials, Parts 134
Round Table Discussions.... 167

BURNHAM FINNEY .....Editor
E. J. TANGERMAN.....Managing Editor

•

Associate Editors: RUPERT LE GRAND, BEN C. BROSHEER (Chicago), ANDERSON ASHBURN, H. E. LINSLEY, CHESTER S. RICKER (Detroit), MILES J. ROWAN

•

Assistant Editors: CHARLES D. EMERSON, EILEEN ERSHLER, LIONEL J. HOLMES (News)

•

SYDNEY OXBERRY.....Art Director
RICHARD ROOMAN .....Assistant
ANNE PALMER .....Makeup

•

DEXTER KEEZER..Director, Economics Dept.

•

RUSSELL F. ANDERSON..Editor, World News

•

GEORGE E. DOYING, JR.....Washington

•

FRED H. COLVIN.....Editor Emeritus

•

ALBERT HAUPTLI.....Publisher
WILLIAM E. KENNEDY.....Asst. Publisher

•

District Managers: JOHN H. KOCH, M. A. WILLIAMSON, JR., Statler Building, Boston, Mass.; JAMES A. McGRAW, HUGH BRITTON, 330 W. 42nd St., New York 18, N. Y.; DAVID G. JONES, Architects Bldg., 17th & Sansom Sts., Philadelphia 3, Pa.; RAY DEEN, ANSON E. MEANOR, 520 N. Michigan Ave., Chicago, Ill.; ADOLPH F. TISCHER, Hanna Bldg., Cleveland, O.; ROBERT H. ANDERSON, 1110 Delta Ave., Cincinnati, O.; PHILIP G. WEATHERBY, Penobscot Bldg., Detroit, Mich.; JOHN W. OTTERSON, 68 Post St., San Francisco, Calif., CARL DYSINGER, 621 So. Hope St., Los Angeles, Calif.; R. C. MAULTSBY, Rhodes-Haverty Bldg., Atlanta, Ga. Other offices: Continental Bldg., St. Louis, Mo.; National Press Bldg., Washington, D. C.; Oliver Bldg., Pittsburgh, Pa.; Aldwych House, Aldwych, London, W.C. 2.

•

Member of ABP and ABC.

•

COPYRIGHT 1949 by McGraw-Hill Publishing Company, Inc. All rights reserved.

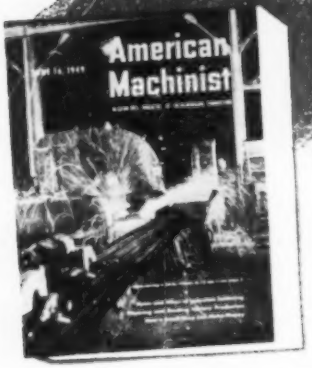
•

Published every other Thursday. Price 35c per copy. Allow ten days for change of address. Subscription Rates: United States and possessions, $5 a year, $8 for two years, $10 for three years. Canada, $6 for one year, $10 for two years, $12 for three years. Pan-American countries, $10 for one year, $16 for two years, $20 for three years. All other countries, $20 a year, $30 for two years, $40 for three years. Please indicate position and company connection on all subscription orders. Entered as second-class matter, August 13, 1943, at Post Office, New York, N. Y., under the act of March 3, 1879. Printed in U.S.A. Return postage guaranteed.

American Machinist is indexed regularly in the Engineering Index and the Industrial Arts Index.

PUBLISHED BY McGRAW-HILL PUBLISHING COMPANY, INC.
330 West 42nd St., New York 18, N.Y.
Cables: "McGRAW-HILL, New York"

James H. McGraw (1860-1948), Founder; James H. McGraw, Jr., President; Curtis W. McGraw, Vice-President and Treasurer; Eugene Duffield, Executive Assistant for Publications; Nelson Bond, Director of Advertising; Joseph A. Gerardi, Secretary; J. E. Blackburn, Jr., Director of Circulation



Chips and QUIPS

Our Cover . . . Biting through a 24-in. I-beam in 11.6 sec is everyday work for this Kling No. 4200 circular friction saw at the Chicago plant of Joseph T. Ryerson & Son, Inc. Such machines (See *A.M.* Reference Book Sheet, Sept. 8, 1948) cut by concentrating friction heat on the steel faster than the material can absorb it. The contact surface becomes hotter than the 25,000-fpm blade rim, so "sparks" (really minute chips) are torn loose and carried away, cutting through the steel faster than any other process except shearing.

This machine is of the latest type, with increased spark control and blade cooling, reduced water spillage on the work and shielding of machine guides. Oil cylinders provide forward feed up to 28 fpm, return of 60 fpm. Kodachrome by Alex Rodsater of Grant-Jacoby Studios for Kling Bros. Engineering Works, Chicago.

Induction Soldering . . . Frank Curtis comes up with another of his sketched-idea series on induction heat, this one on soldering. For good measure, he's included fundamentals on soft solders.

Bent Twig . . . Thompson Products began training apprentices 13 years ago, has had about 10 years of experience with it (3-year wartime suspension). The secret of success, explained by T. J. Haas, manager of trade training, is smart balancing of shop, management, engineering, and general education with a liberal dose of social life and importance thrown in. Tapco selects the top dozen of 300 applicants each year and gives them a real course of sprouts. The details are described in this issue.

Indicators . . . Most of our Special Reports are round-ups from many sources, but occasionally we run into a man with so much useful dope at his fingertips that we break our rule and bring it to you. Our current Report is a case in point. I. A. Hunt, who has worked with dial indicators for many years, believes many shop men do not realize how widely indicators can be used. Too frequently, the indicator is reserved for the occasional top-accuracy job—as indicated by the fact that the 0.0001-in. unit outsells the 0.001-in. unit two to one—instead of being put to real shop use.

Changes . . . As we write, one editor is in Savannah, one in Milwaukee and two at the A.M.A. meeting across New York. Quite a change from the old days, when editors took "a swing around" once a year. But nowadays readers want the latest, *right now*—not when somebody can get around to writing it. . . . So tomorrow the man in Springfield goes to Columbus, then to Cincinnati, the one in Wilmington goes to Hartford, the one in Milwaukee goes to Indianapolis, the one in Savannah goes to Tampa, and we go to Springfield, Vt. . . . But we'll stop on the way to try for trout reared in a hatchery, using a magnesium alloy pole with stainless steel guides, an aluminum alloy reel with phosphor-bronze spool, a nylon line and some artificial flies. . . . So even fishing has changed.

Saleswoman . . . The Van Keuren Co. has a woman selling its gages in Western Michigan. Our Chicago Nero Wolfe and epicure, Anson Meanor, reports he saw her calling on Keller Tool Co.

Small Shops . . . For the men who shout, "Give us more for the small shops," we include two articles, one showing how a small machine shop can make money, the other describing how to plan and route variety production.

Coming . . . *A.M.* for June 30 will include a Special Report on Coolant Filtration, plus articles galore. For production management, there'll be an article on charting customer complaints to improve production and one on safety policies at Frankford Arsenal. For tool and shop men, there's an article on bulging dies at Hotpoint, one on pilots for progressive dies, one on threading stainless, one on grinding flat surfaces, one on special machining of cast iron and one on gas-shielded arc welding.

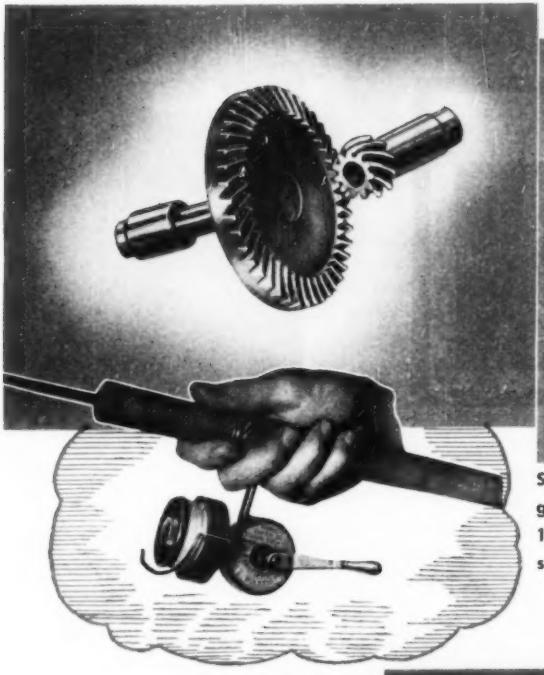
TOOL ENGINEER . . . J. R. Paquin completed engineering studies at Lowell Textile Institute in 1940, and joined General Electric, where he worked on tool conversion to war work. From 1942 to 1945, he was in charge of various Air Force machine shops, in this capacity he designed and developed special tools for the first production maintenance system installed by the Air Force, and later adopted by air bases throughout the world. 1944 found him Chief Designer at the great B-17 School of Lockbourne Air Base, Columbus, Ohio. In 1946, he joined the Republic Aircraft Corp., where he developed tooling for the F-12 (Rainbow), and the P-84 jet plant. There followed tool engineering assignments at United Aircraft Products Corp., Frigidaire Div.—General Motors Corp., Crompton & Knowles, National Can Corp., and Associated Engineers. He is now a tool engineering consultant at Worcester, Mass., and has written us several articles, his latest (die clearances) in this issue. He is a senior member, ASTE.

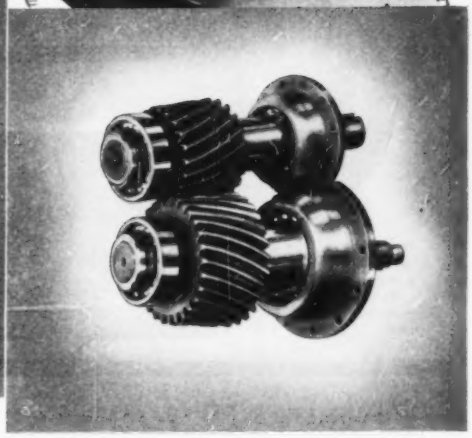
HAVE YOU INVESTIGATED USING BEVEL AND HYPOID GEARS?

Bevel gears to transmit power and motion "around a corner" can be produced to satisfy any angular requirements. Gleason engineers will recommend the correct type of gear for your use and help you with their design and mountings.

Two applications where accurate bevel gears perform an outstanding service are shown below.

The spinning reel, using a pair of sturdy, precision-cut spiral bevel gears provides the angler with many satisfied hours of smooth, noiseless casting.





Spiral bevel gears have been used in Diesel sea-going yachts for engines-in-stern propulsion since 1934. The original installation has never required servicing . . . yet they outlasted two pairs of engines.

Write for literature on the design and manufacture of bevel gears.

As builders of bevel gear machinery for the manufacture of straight bevel, spiral bevel, Zerol bevel and hypoid gears, we offer to help you with your bevel gear design problems . . . to furnish estimates of production time and costs . . . and to suggest the right equipment for your requirements.

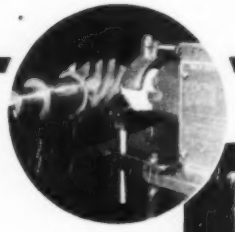
GLEASON Works
1000 University Avenue
Rochester 3, N.Y., U.S.A.

Builders of Bevel Gear Machinery for Over Eighty Years

Your Shop needs both OF THESE MACHINES

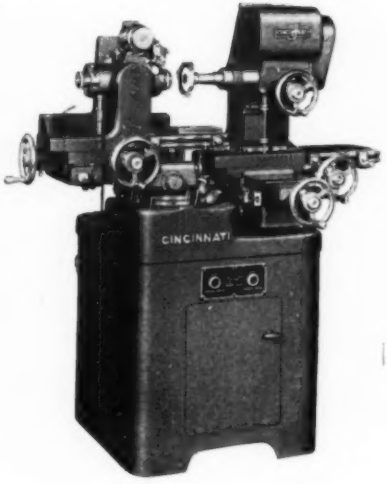
CINCINNATI No. 2 Cutter and Tool Grinder for sharpening most of the commonly used cutters.

CINCINNATI MONOSET for sharpening and making small intricate cutters.



Left: Grinding a plain helical cutter on a CINCINNATI No. 2 Cutter and Tool Grinder.

This group of small intricate cutters was made on a CINCINNATI MONOSET Cutter and Tool Grinder—some of them from scrap.



The CINCINNATI No. 2 Cutter and Tool Grinder is an efficient machine for sharpening all types of cutters used in the average shop; milling cutters, planer tools, reamers, etc. And a wide selection of CINCINNATI attachments extends the range of the No. 2 Cutter and Tool Grinder from very small end mills to face milling cutters as large as 18" diameter.

The CINCINNATI MONOSET Cutter and Tool Grinder is principally for small intricate cutters, like those shown in the illustration. With this machine you *can make small cutters* (grind the flutes from the solid) as well as sharpen them.

Illustrated catalogs, M-1618-1 for the CINCINNATI No. 2 Cutter and Tool Grinder, and M-1589 for the CINCINNATI MONOSET may be obtained by writing to the address below.

THE CINCINNATI MILLING MACHINE CO.

CINCINNATI 9, OHIO, U. S. A.

MILLING MACHINES • BROACHING MACHINES • CUTTER SHARPENING MACHINES
FLAME HARDENING MACHINES • OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

CINCINNATI FILMATIC Traveling Table Roll Grinders

SAVE HOURS OF TIME IN THE ROLL SHOP

CINCINNATI FILMATIC 28" x 168" Heavy Duty Traveling Table Roll Grinding Machine.

. . . and you can depend upon having rolls of high quality when you need them. Of the new CINCINNATI FILMATIC Traveling Table Roll Grinder's many features, just consider these two that give the machine the dependability of "Old Faithful."

FILMATIC grinding wheel spindle bearings. In 10 years, over 99% have required no time off for any reason whatever.

Circulating, filtered pressure lubricating system for the ways, with electrical pressure switch protection.

There are other features, too, that pay off in time saved and improved finish:

Automatic wheel balancing
Electronic table traverse

A new catalog, G-587, tells you all about these new CINCINNATI FILMATIC Roll Grinding Machines. A copy is yours for the asking.

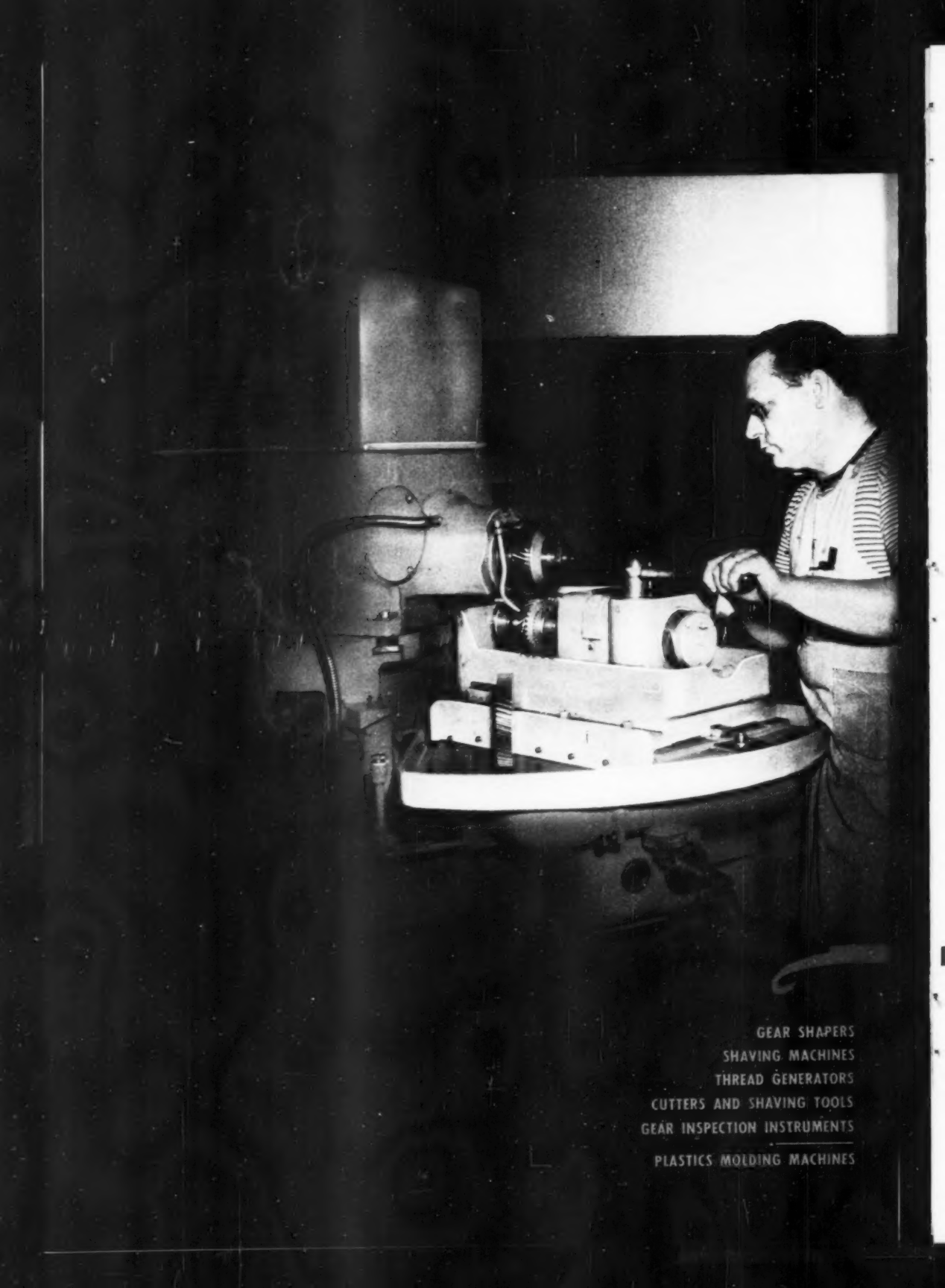
Close-up of operator at the machine, showing convenient grouping of operating controls and electrical push buttons.

CINCINNATI

CINCINNATI GRINDERS INCORPORATED

CINCINNATI 9, OHIO, U. S. A.

CENTER TYPE GRINDING MACHINES • CENTERLESS LAPPING MACHINES • CENTERLESS GRINDING MACHINES



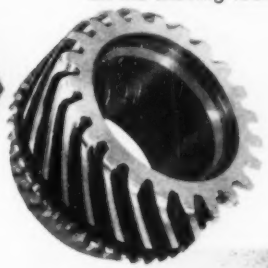
GEAR SHAPERS
SHAVING MACHINES
THREAD GENERATORS
CUTTERS AND SHAVING TOOLS
GEAR INSPECTION INSTRUMENTS

PLASTICS MOLDING MACHINES

'FULL-TOOL' SHAVING Sets a Pace...

Shaving as a finishing process now assumes an important role in low-cost mass production. In the Fellows 'Full-Tool' method you have a finishing process that more than doubles output. The unique manner of tool application provides a shorter stroke with freer cutting at higher reciprocating speeds. Cutting action is so distributed as to obtain an even finer finish with less wear on the shaving tool. The production-minded manufacturer will want to know more of the facts and figures on this new method of low-cost finishing. Write our nearest office.

'FULL-TOOL' SHAVED IN 23 SECONDS!



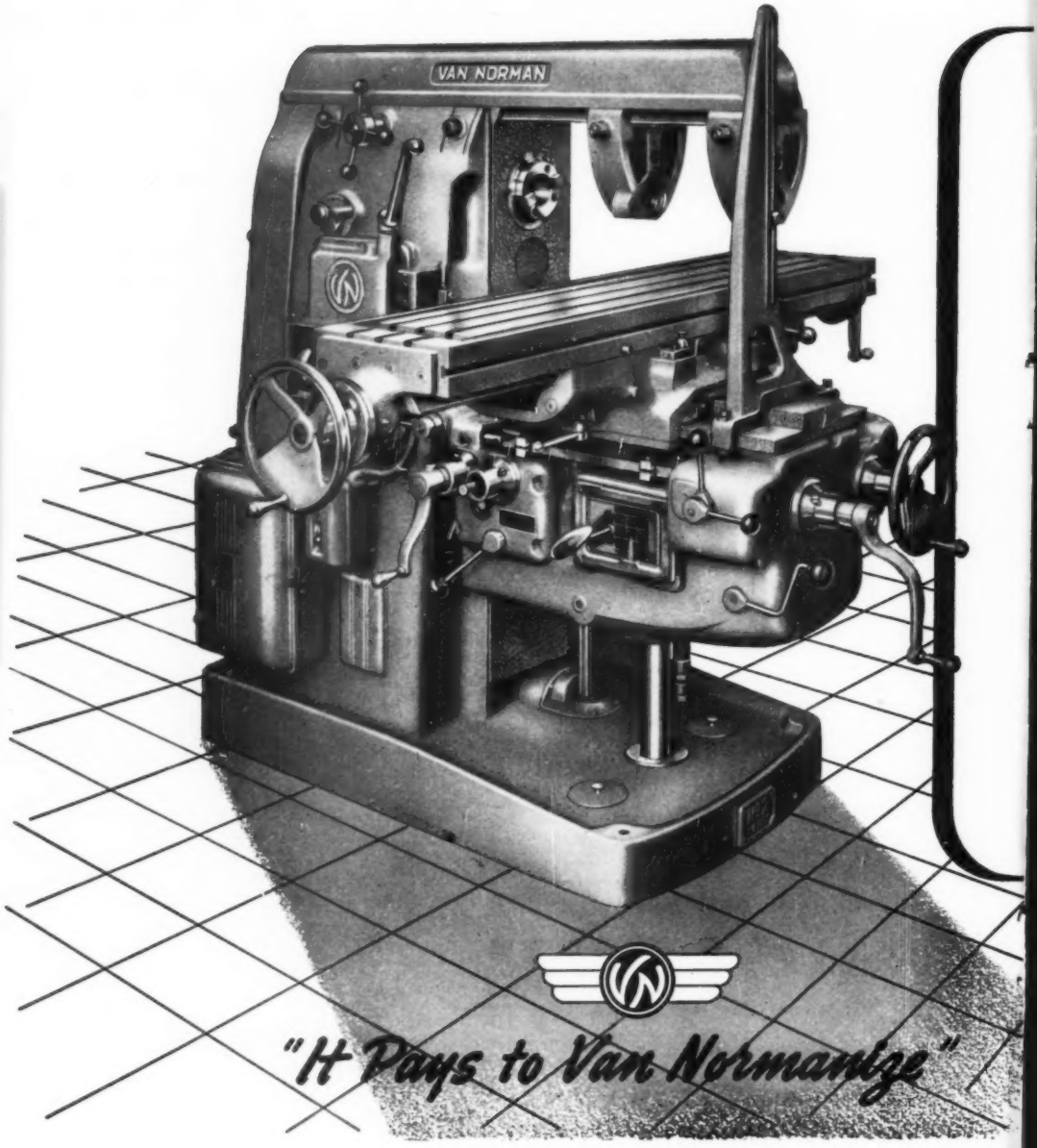
'FULL-TOOL' SHAVED IN 15 SECONDS!

Fellows

THE FELLOWS GEAR SHAPER COMPANY • Head Office and Export Department • 78 River Street, Springfield, Vermont
Branch Offices: 616 Fisher Bldg., Detroit 2 • 640 West Town Office Bldg., Chicago 12 • 7706 Empire State Bldg., New York 1.

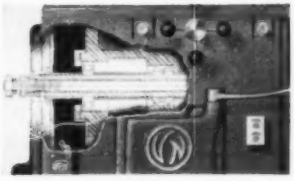
VAN NORMAN HORIZON

Provide Improved Cutability...



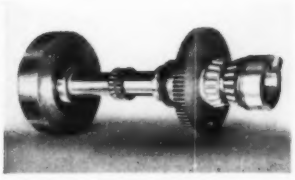
TAL MILLING MACHINES

Exceptional Ease of Control



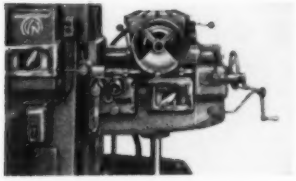
Built-in Spindle Flywheel

The Van Norman spindle design incorporates a heavy flywheel mounted inside the column. It assures uniform, uninterrupted transmission of power to the cutter because it effectually cushions by its inertia, any fluctuation of speed and power. The flywheel increases and improves cutability . . . results in a smooth finish of work surface.



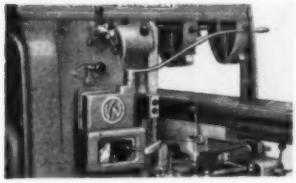
5-Bearing Spindle

The large diameter hardened alloy steel cutter spindle rotates on 5 anti-friction bearings. Large double-opposed taper roller bearings in front provide minimum overhang . . . center double-opposed taper roller bearings add rigidity. A straight roller bearing supports the rear. This construction assures maximum spindle support and rigidity under every type of cut.



Front & Rear Power Control

All power feed controls, as well as 6-way rapid traverse, can be operated from front or rear of the machine. This dual feed control simplifies operation, saves time, reduces worker fatigue. The finger tip controls are directional and can be operated either with spindle stopped or rotating.



Ease of Spindle Control

The single lever speed selector, convenient spindle reverse and spindle clutch levers are located on the side of the column for ease of control. The spindle clutch lever for starting and stopping the spindle is quickly adjusted to the desired and most convenient front or rear operating position.

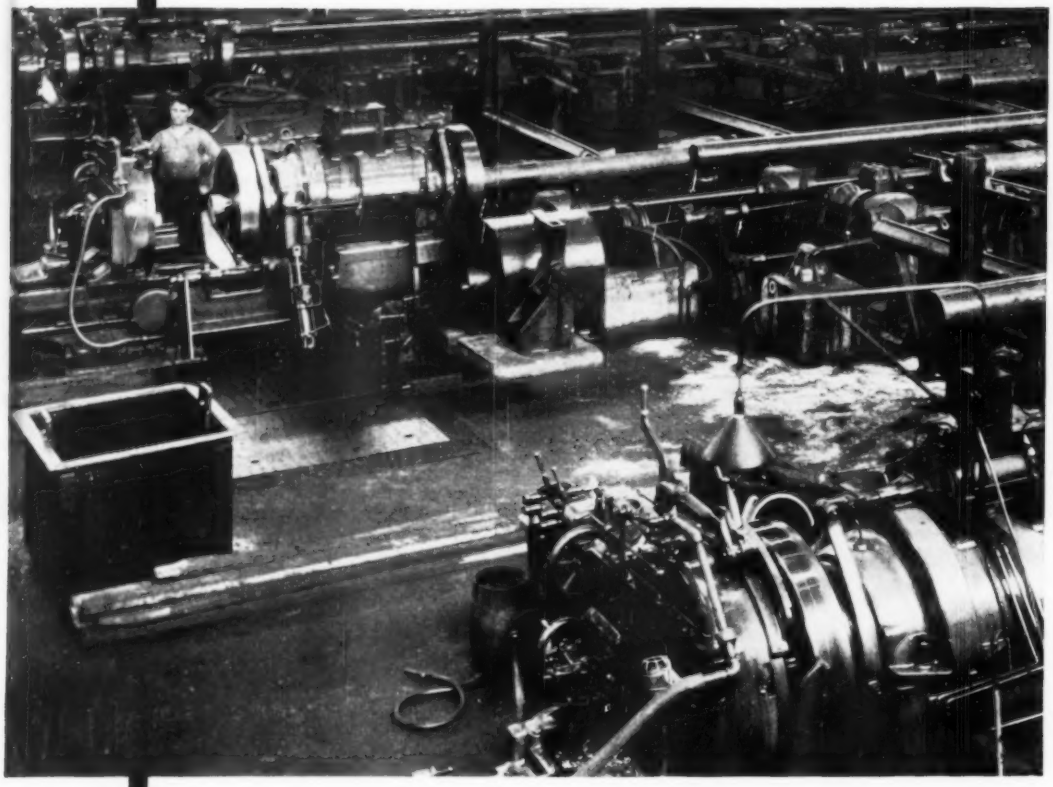
From every angle, Van Norman Horizontal millers give you every advantage in cutability and ease of operation. These machines will give maximum quality service and increase production on a wide variety of general purpose and production milling. They are available in a wide variety of models and can be had with plain or universal saddles. Write for complete information.

VAN NORMAN COMPANY

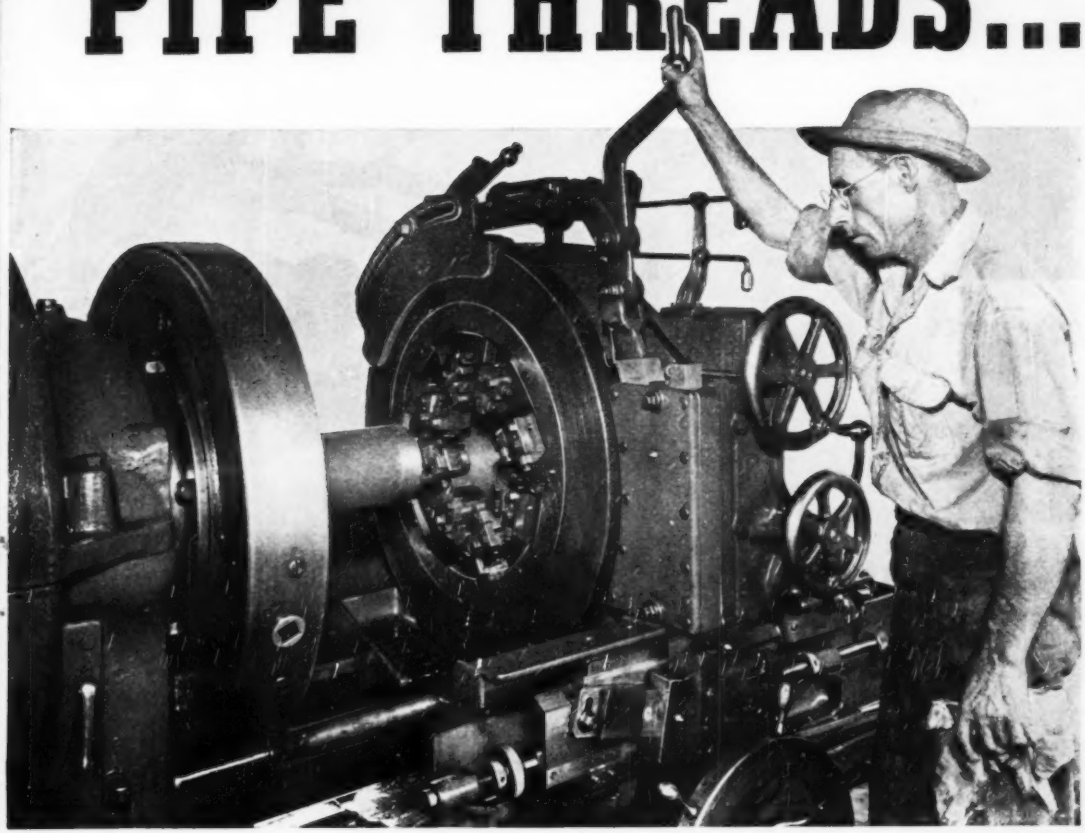
SPRINGFIELD 7, MASSACHUSETTS

SAVE 5 WAYS ON

- ✓ Fewer Machines
- ✓ Lower Tool Cost
- ✓ Lower Tool Inventory
- ✓ Less Set-up Time
- ✓ Higher Production



PIPE THREADS...



In tightening markets, Landis Pipe Threading Machines offer wide-open opportunities to cut production costs of pipe threads.

Three sizes of Pipe Machines will handle all diameters of pipe from 1/4" to 18". Each die head is constructed to handle a wide range of pipe sizes—for example the 6" machine will thread all diameters from 1" to 6". Universal size adjustment allows quick set-up. Thus, a few machines will handle the complete range.

Die heads employ Landis Tangential Pipe Chasers. Interchangeability of the chasers further increases the versatility of these machines. The same chasers may be used for all diameters of threads within the range of a given die head providing that the pitch, form, and taper remain the same, thus reducing tool inventory. Chasers need be replaced only one at a time as needed. Chasers last longer since 80% of their length may be reground as the cutting edge dulls. Line contact with the work reduces friction and chaser wear, allows use of higher cutting speeds, and reduces chaser breakage.

A separate type of machine, the Receding Chaser Pipe Machine, is especially designed to handle A.P.I. Tapered Pipe Threads. Chasers recede into the head at a rate equal to the taper of the thread, ensuring accurate and uniform taper along the full thread length. This mechanism allows the use of smaller chasers, lowering tool cost and dollar tool inventories. Leave-off marks are eliminated by this receding action.

Investigate how Landis Pipe Machines can reduce direct tool cost, increase daily production, and reduce investment in tool inventory and heavy machinery. Write for specifications and further information.

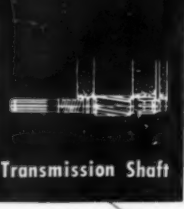
LANDIS Machine COMPANY

WAYNESBORO • PENNSYLVANIA • U. S. A.

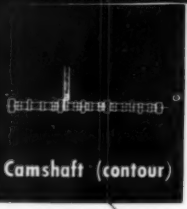
Hypoid Gear

Differential Case

Universal Joint Spider



Transmission Shaft



Camshaft (contour)

Rear Axle

Ball Bearing Race

17 Automotive Grinding Problems Solved with LANDIS TOOL Precision Grinders

- lower unit costs
- closer limits - fine finishes
- mass production

Illustrated above are some of the typical grinding problems in automotive production that have been solved with LANDIS TOOL precision grinders.

LANDIS TOOL *Precision Grinders*

Your grinding problem may be similar or entirely different. Our engineers will be glad to help you solve it. Recommendations will be made on the basis of your blueprints.

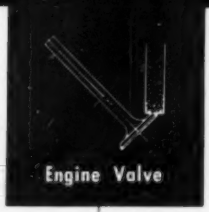
multiple wheel grinders

crankshaft grinders

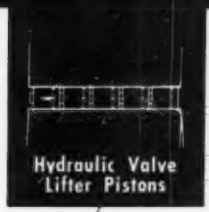
centerless grinders

plain grinders

Camshaft (main bearings)



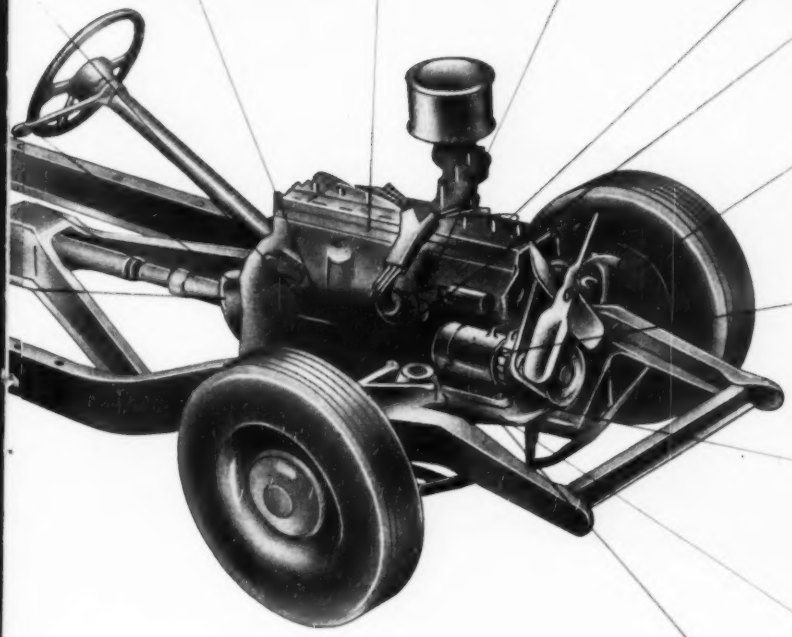
Engine Valve

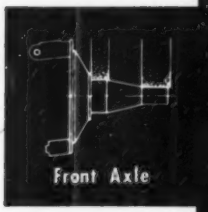


Hydraulic Valve Lifter Pistons

Piston

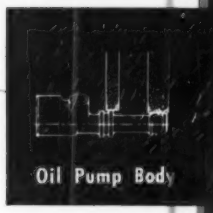
Distributor Cam





Front Axle

Generator Shaft



Oil Pump Body

Crankshaft (line bearings)

Crankshaft (pins)

LANDIS TOOL COMPANY, 12 EAST SIXTH STREET, WAYNESBORO, PENNA.

The most complete line of standard and special purpose precision cylindrical grinders available to automotive builders and suppliers.

camshaft grinders

valve grinders

ball bearing race grinders

How ONE TOOLMAKER . . .

USED THIS GUIDE . . . . . .

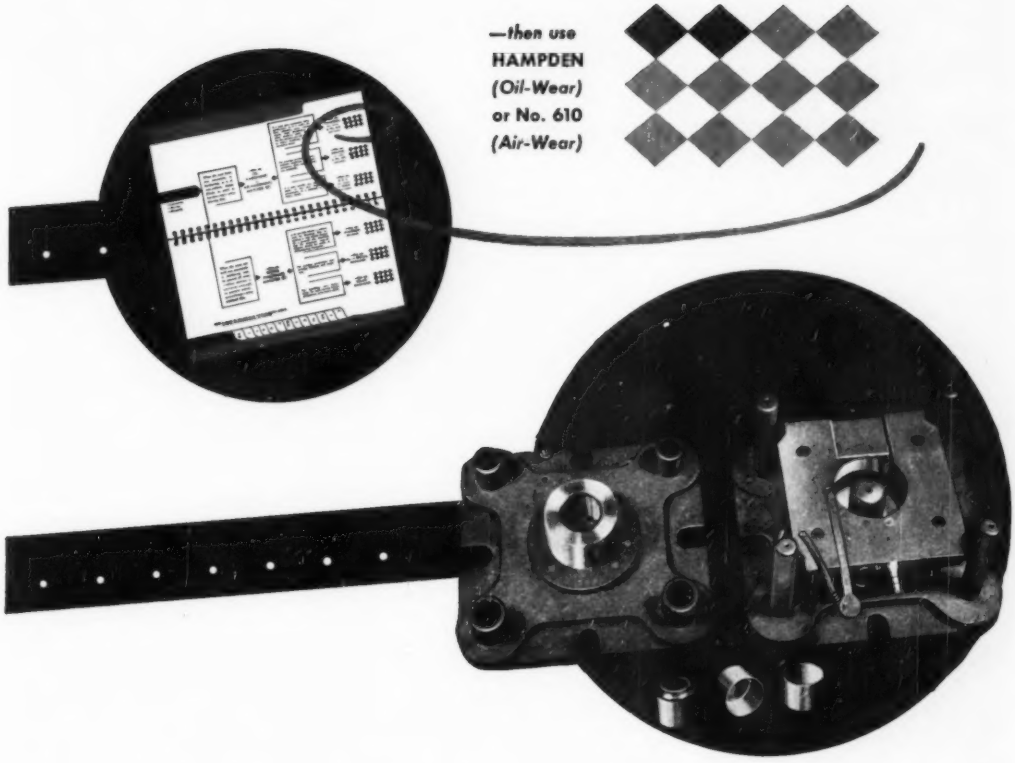
TO HOLD DOWN UNIT COSTS . .

At which step in your tooling process would you welcome real help in reducing tool and die costs? Tool Steel Selection? Heat Treating?—or on-the-job "Trouble-Shooting"? Here's how you, like the maker of the Dies shown here, can start to reduce costs with a Method that helps you at *all 3* steps.

First, to make selection easier and more accurate, use the handy Selector Section in the Carpenter Matched Tool Steel Manual. Quickly and surely, it enables you to put your finger on the proper steel for best results. Next, to further insure tool and die performance, use the Manual's complete heat treating instructions—they have been simplified beyond anything previously known. It's easy to get started—use the Matched Set Method to help you "trouble-shoot" your present tool and die jobs.

All along the line the Carpenter Matched Set Method can help you get better, lower-cost tooling. Ask for the complete working data contained in the 189-page Carpenter Matched Tool Steel Manual. See your nearby Carpenter representative, or write us on your company letterhead, indicating your title.

THE CARPENTER STEEL COMPANY, 109 W. BERN STREET, READING, PA.



Job: Compound Blank and Draw Die for forming .031", ¼-hard brass Vent Valve Bodies at the rate of 103 per minute on a punch press.

Problem: Unit costs were on the upswing because the old dies wore too rapidly, causing frequent and costly machine shut-downs for regrinding.

Solution: Looking for a die steel with maximum wear resistance, the toolmaker referred to the Selector Section in the Carpenter Matched Tool Steel Manual, and quickly arrived at Carpenter *Hampden* (Oil-Wear).

Heat Treatment: Simplified instructions in the Manual were followed.

Results: 2 hours of costly machine downtime were eliminated *each day*—production per grind *rose over 300%!* As a matter of interest, the toolmaker takes off approximately .0005" per stoning and gets about 100 grinds from the Blank and Draw Die.

Export Department: 233 Broadway, New York 7, N.Y. "CARSTEELCO"

Carpenter

MATCHED

TOOL & DIE STEELS

NOW—To make identification quick and positive, the entire surfaces of all Carpenter Matched Tool and Die Steel bars are marked *full length*—each grade with its own distinctive color.

IMMEDIATE DELIVERY FROM LOCAL STOCKS!—Call Your Nearest Carpenter Warehouse or Distributor

Atlanta • Baltimore • Boston • Bridgeport, Conn. • Buffalo • Chicago • Cincinnati • Cleveland • Dayton • Detroit Grand Rapids, Mich. • Hartford • Houston • Indianapolis • Kansas City • Los Angeles • New York • Philadelphia Providence • St. Louis • Worcester, Mass. • *In Canada:* Toronto • Montreal

LINK-BELT Industrial Standard Silent Chain designed like this

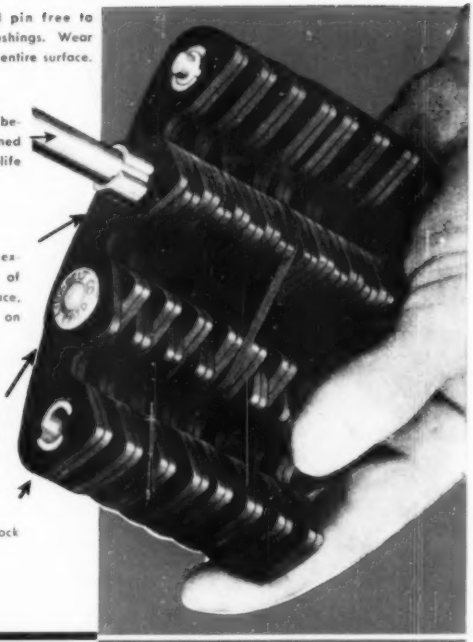
Case-hardened pin free to rotate within bushings. Wear distributed over entire surface.

Smooth, hardened pin rotates between two semi-circular hardened steel bushings — adds years of life to the drive.

Removable segmental bushings extend across the entire width of chain. Doubles bearing surface, and halves bearing pressure on joint.

Elastic guide link achieves equal load distribution across the entire width of chain.

Broached holes in links form lock grip for bushings.

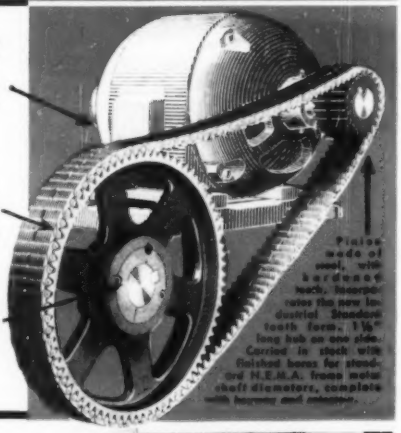


Gives you DRIVE ADVANTAGES like this

The new Industrial Standard Silent Chain is available in two stock pitches — ½" (SC-4) and ¾" (SC-6), middle guide type.
SC-4 Stock Widths — ¾", 1" 1½", 2", 2½", 3", 3½".
SC-6 Stock Widths — 2", 3", 4", 5".

Sprocket made of cast iron, with new Industrial Standard tooth form. Taper-bored to accommodate Taper-Lock Bushing. No reboring or keyseating necessary.

Taper-Lock Bushing made of gray iron having a high steel content. Tapered for easy assembly into sprocket hub. Assures tight fit of sprocket on shaft.

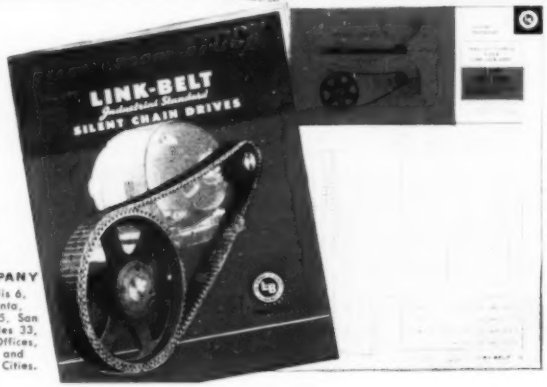


Pinion made of steel, with hardened teeth. Incorporates the new Industrial Standard tooth form. 1½" long hub on one side. Carried in stock with finished bores for standard N.E.M.A. frame motor shaft diameters, complete with keyway and setscrew.

. . . and can be delivered from STOCK like this

The "Pre-selected" drives listed in Book No. 2125-A can be delivered from stock immediately by your nearest Distributor or Factory Branch Store.

For easy-to-use selection tables on ½ to 50 h.p. stock drives, ask for Book No. 2125-A.



LINK-BELT COMPANY

Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices, Factory Branch Stores and Distributors in Principal Cities.

Here's a million-dollar question:

How many
UNCOUNTED OPPORTUNITIES HAVE YOU...*to increase your product's sales?*

Give a product a useful new feature... give it the ability to supply to its users exact facts-in-figures on its performance or production... and you apply a powerful booster to sales.

This has been proved to manufacturers in almost every industry who have built Veeder-Root Counters into their products as integral parts, to count everything from coins inserted to parts produced. Few counter uses are alike ...*many were not apparent at all* until a Veeder-Root engineer was called in to see if he could figure one out. And today, it's worth anyone's time to find out if he can count his way to new sales (*perhaps even new markets*) with the competitive selling advantages gained by built-in Veeder-Root *Count*rol. How about *your* products? Write.

VEEDER-ROOT INCORPORATED, HARTFORD 2, CONNECTICUT

In Canada: Veeder-Root of Canada, Ltd., 955 St. James Street, Montreal 3. *In Great Britain:* Veeder-Root Ltd., Kilspindie Road, Dundee, Scotland.

Veeder-Root COUNTERS

The NORTON Wheel

RUGGED — For Heavy Stock Removal

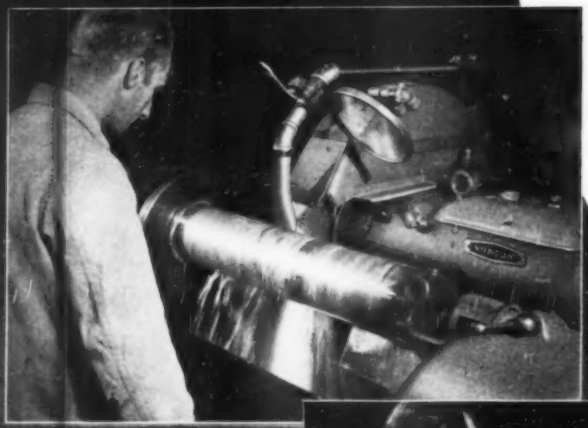
PRECISE — For Close Tolerances and Fine Finish

THE grinding wheel spindle unit is the heart of a precision grinder. On its qualities depends the ability of the grinder to give ENDURING PRECISION.

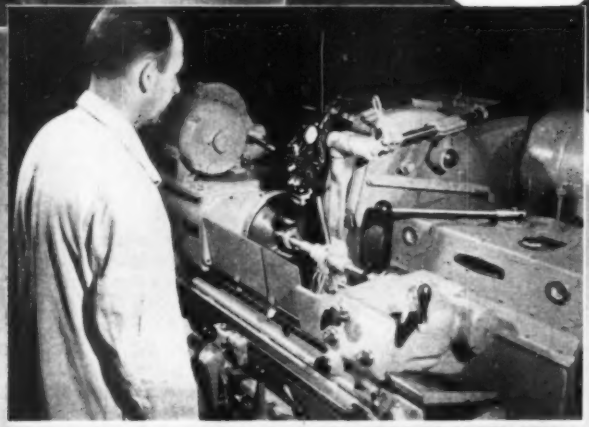
The Norton Wheel Spindle Unit is the heart of Norton Cylindrical Grinders from 4″ to 36″ swing capacity. It has time-proved its ability to deliver ENDURING PRECISION in thousands of plants throughout the world.

Improved and refined in the new Type CTU and other Norton Grinders, this famous Norton "Heart" provides the ruggedness for heavy stock removal, and the precision for finest finishes and closest tolerances.

It gives Norton Grinders the ENDURING PRECISION to enable you to meet today's—and tomorrow's —tough competitive conditions



RUGGED—Roughing a spindle casting



PRECISE—Grinding a diameter on a shaft to extremely close tolerances

NORTON GRINDERS and LAPPERS

Spindle Unit

DESIGN HIGHLIGHTS

- In the **Norton Wheel Spindle Unit** design, a ruggedly proportioned spindle of toughened, wear-resistant steel runs on a film of filtered lubricant in long, heavy, hard-bronze bearings. These bearings provide support over practically the entire circumference of the spindle.
- This Norton unit offers extreme resistance to wheel pressures, belt pulls, and to those other factors that tend to reduce precision and shorten life.
- Long and continuous bearings surfaces confer extreme rigidity and insure low unit pressure. This low unit pressure helps to maintain adequate lubrication and sustains efficiency.
- This heavy duty bearing design, plus precision bored casings, assures permanent alignment between wheel spindle and work center-lines.

FEATURES

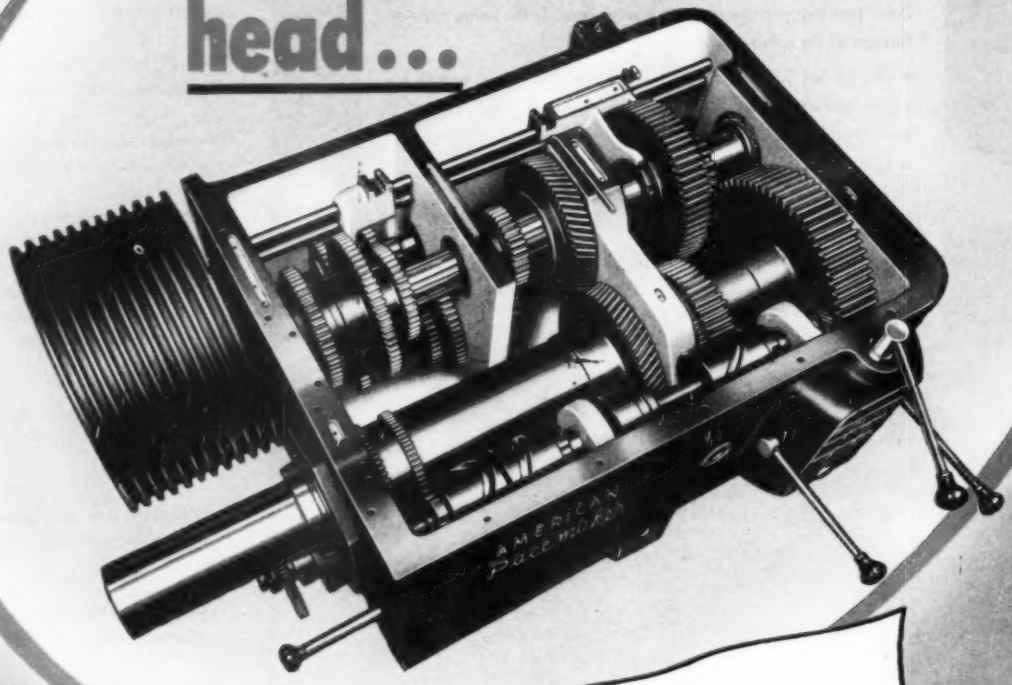
- **Over 50% of spindle body** supported in two super-duty size, hard bronze bearings.
- ***Ruggedly proportioned spindle** is toughened to resist wear.*
- **Spindle is rigidly supported** over practically its entire circumference.
- ***Bearing length** over twice the diameter—a very desirable feature.*
- **Bearings automatically flooded** by filtered lubricant.
- ***Heavy-duty end thrust bearing** at center of spindle is flood lubricated.*
- **Self-contained lubricating unit** within wheel spindle housing delivers film of filtered lubricant between spindle and bearings.
- ***Automatic lubricant flow** clearly visible through bull's-eyes—an important safety feature.*
- **Extremely low unit pressure** due to long and continuous bearing surfaces.
- ***Wheel speed changes** possible without readjustment of bearings.*
- **The Norton spindle** stays on its fixed center-line—no shifting is possible.
- ***An unmatched service record**—many thousands in use.*

Continued research has not yet produced a better or more reliable spindle unit

NORTON COMPANY, WORCESTER 6, MASS.
Distributors in All Principal Cities

Not one Friction or Jaw Clutch in the NEW

"American" Pacemaker head...



1 The entire head transmission is of the slip gear type.

2 All gears and shafts are hardened and ground.

3 Transmission shafts are multiple splined with splines ground.

4 Entire head is automatically pump oiled with clean filtered oil.

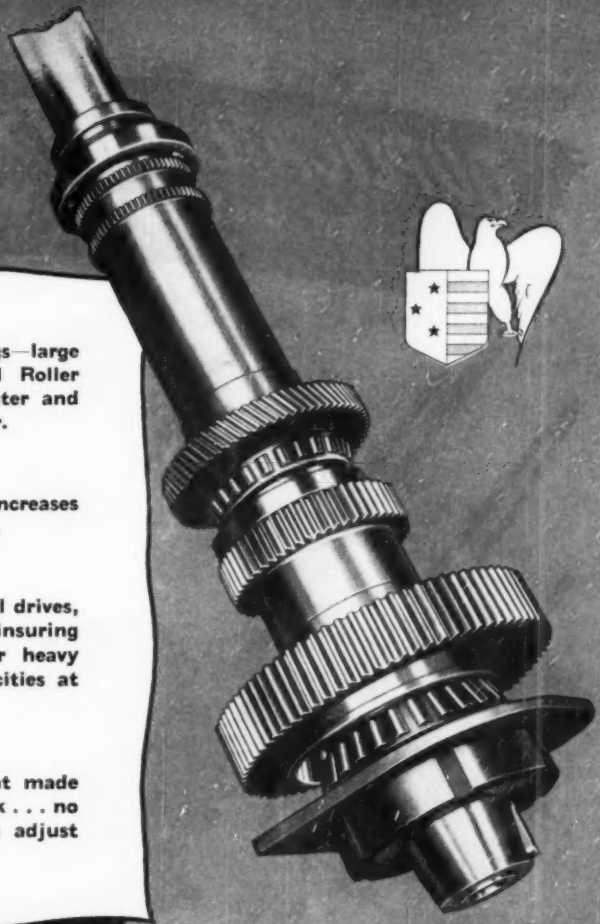
5 9, 18 or 27 spindle speeds are available.

6 Speed control concentrated and direct reading.

THE AMERICAN TOOL WORKS CO.

PATENTED

TRIPLE DRIVE SPINDLE

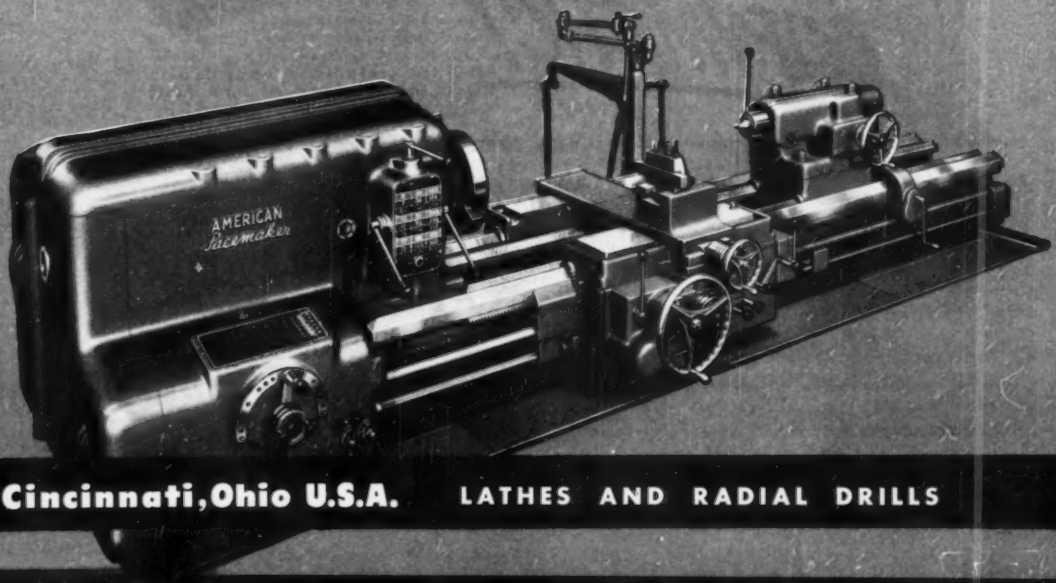


7 Spindle has three bearings—large Timken Precision Tapered Roller Bearings at front and center and floating ball bearing at rear.

8 Addition of center bearing increases the spindle stiffness 8 times.

9 Spindle has three individual drives, each immediately selective, insuring low tooth pressures under heavy service and moderate velocities at high speeds.

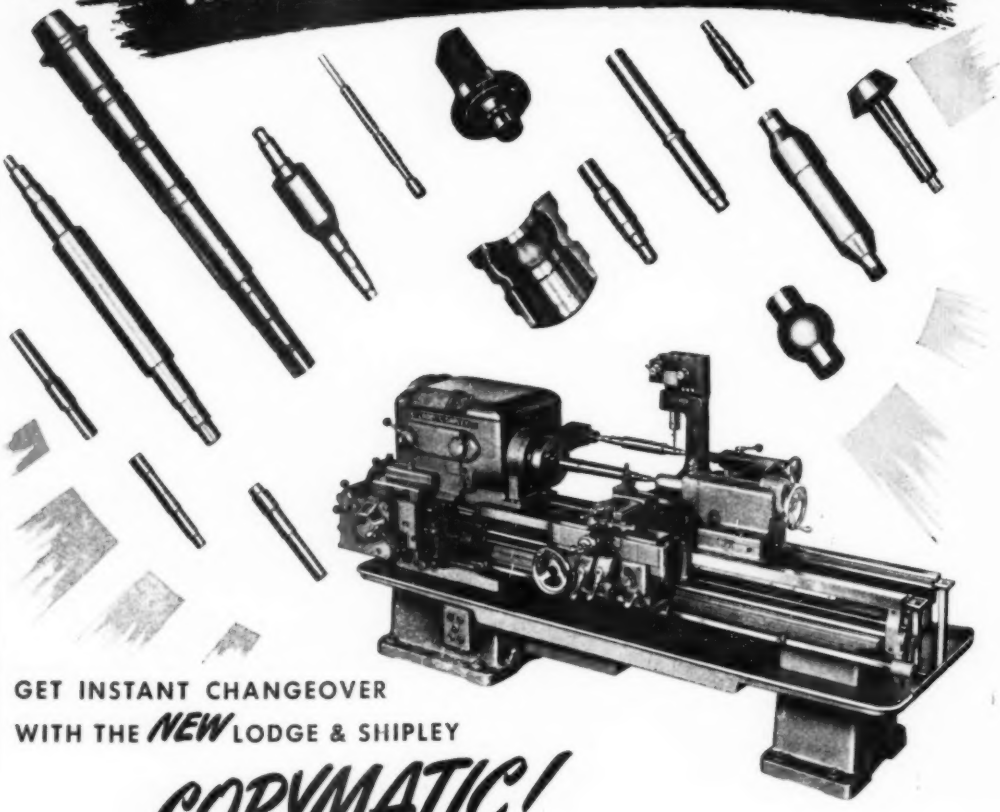
10 Spindle bearing adjustment made from OUTSIDE of headstock . . . no digging inside of head to adjust spindle bearings.



Cincinnati, Ohio U.S.A. LATHES AND RADIAL DRILLS

DUPLICATE PARTS LIKE THESE

...or do Regular Lathe Work!



GET INSTANT CHANGEOVER
WITH THE *NEW* LODGE & SHIPLEY

COPYMATIC!

FROM either round or flat templates, duplicating various shapes is quickly accomplished with the new COPYMATIC Lathe. Duplicate to close limits square shoulder faces, grinding necks, tapers in both directions, chamfers and curved contours. Best of all, this latest type Lodge & Shipley "Model X" Lathe is not a special purpose machine; it operates as a regular engine lathe, too.

It takes no time at all to change from automatic tracer controlled duplication to regular lathe operation (or vice versa). There are no complicated adjustments . . . no adding or removing of tricky gadgets. Often, the need for a special template is eliminated. The first piece of a lot can be machined by standard operation, placed in the template holder and used to produce the remainder of the lot automatically.

The speed and convenience of automatic duplication, coupled with proven "Model X" efficiency is an ideal combination for more profitable production. Investigate today. Call your Lodge & Shipley Representative or write direct for Bulletin No. 675.

THE **Lodge & Shipley** COMPANY

MACHINE TOOL DIVISION • 3055 COLERAIN
SPECIAL PRODUCTS DIVISION • 800 EVANS ST.
CINCINNATI 25, OHIO

Oster
MADE IN U. S. A.

Progienic

"Supreme in Smoothness"

with GEARS by...

FRACTIONAL HORSEPOWER GEARING

WHENEVER "Supreme Smoothness" is a rigid requirement, that's when it pays to use Fractional Horsepower Gearing by G.S. The John Oster Co. of Racine, Wisconsin, like so many other critical buyers, specifies G.S. Small Gears for UNIFORM *Smoothness* of operation and for the long, economical service they give. If efficient *low cost* production runs of Fractional Horsepower Gearing is an essential requirement in your business by all means come to *"Small Gear Headquarters"* for the kind of quality and service you need. It is no happenstance that industry uses more Fractional Horsepower Gearing by G.S. than any other kind!

SEND FOR OUR CATALOG BULLETIN

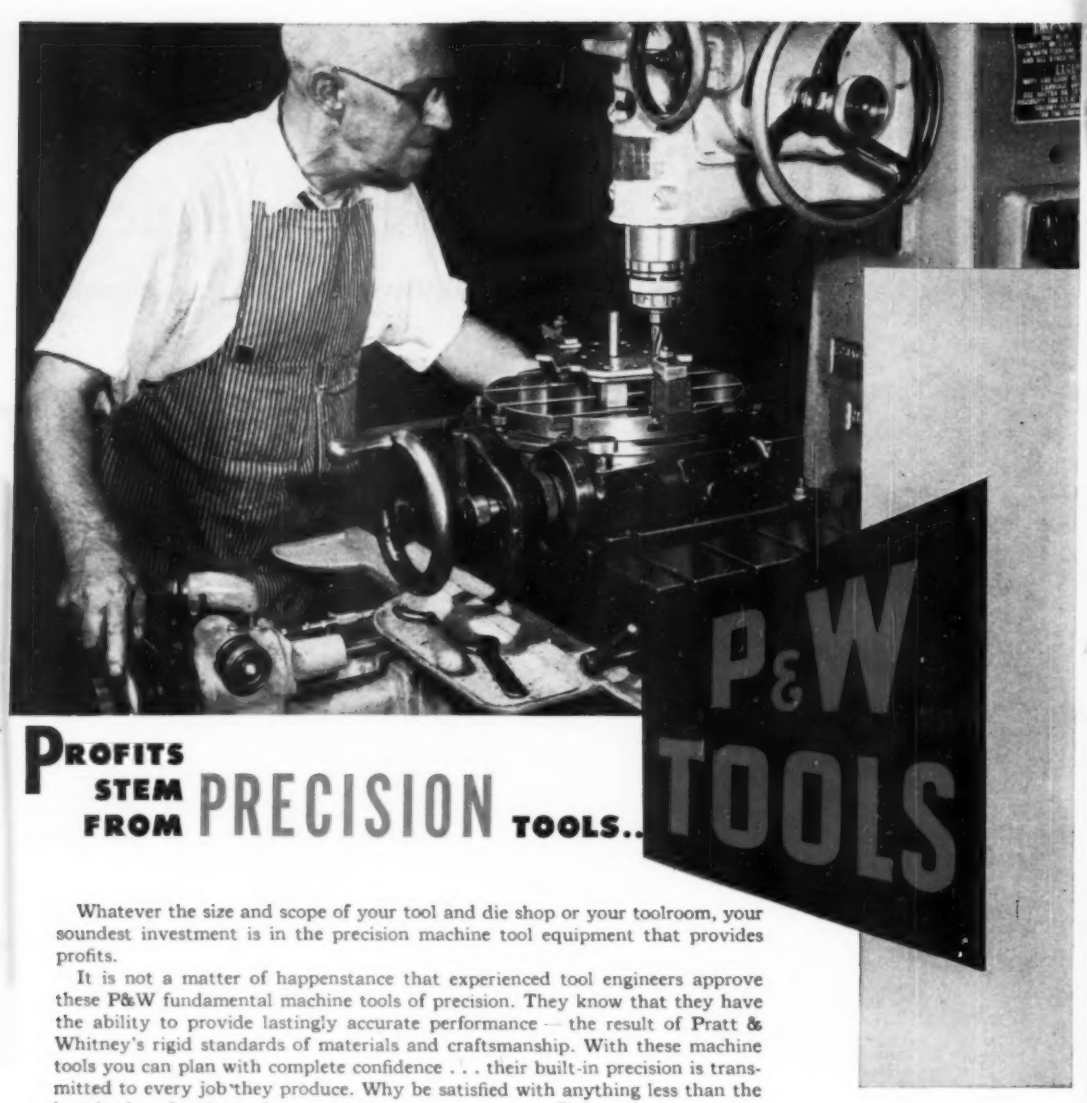
GEAR Specialties

Spurs • Spirals • Helicals • Bevels • Internals • Worm Gearing • Racks • Thread Grinding

2635 WEST MEDILL AVENUE • CHICAGO 47, ILLINOIS

MEMBER OF

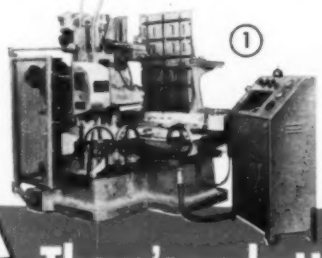
WORLD'S LARGEST EXCLUSIVE MANUFACTURERS OF FRACTIONAL HORSEPOWER GEARS



PROFITS STEM FROM PRECISION TOOLS..

Whatever the size and scope of your tool and die shop or your toolroom, your soundest investment is in the precision machine tool equipment that provides profits.

It is not a matter of happenstance that experienced tool engineers approve these P&W fundamental machine tools of precision. They know that they have the ability to provide lastingly accurate performance — the result of Pratt & Whitney's rigid standards of materials and craftsmanship. With these machine tools you can plan with complete confidence . . . their built-in precision is transmitted to every job they produce. Why be satisfied with anything less than the best in these key items for your shop.



(1) P&W KELLER MACHINE. Faithfully reproduces intricate shapes automatically by accurate tracer-controlled milling. Made in 9 models. Type BL, illustrated.

Pratt & Whitney

Division Niles-Bement-Pond Company
WEST HARTFORD 1, CONNECTICUT

There's no better-paying

When your tool and die shop work is done accurately and quickly . . . like the jig boring job shown opposite . . . you can expect profits and repeat business. Pratt & Whitney equipped shops all over the country have proved it. Here are shown the key tool and die shop machines. For each one there is completely illustrated literature packed full of valuable information. Write today for the ones you need.

Complementing the P&W Die Shop and Toolroom Machines illustrated, the following P&W precision-built tools will ensure the smooth-running efficiency of your production schedules:

. . . Vertical Miller and Profiler — Thread Miller — Vertical Surface Grinder — Centering Machine — Gear Grinder

. . . Keller Cutter and Radius Grinder, to sharpen die sinking tools, Keller cutters and tracers

. . . Keller Flexible Shaft Machines, the "mechanical muscle" to shape and finish dies and molds

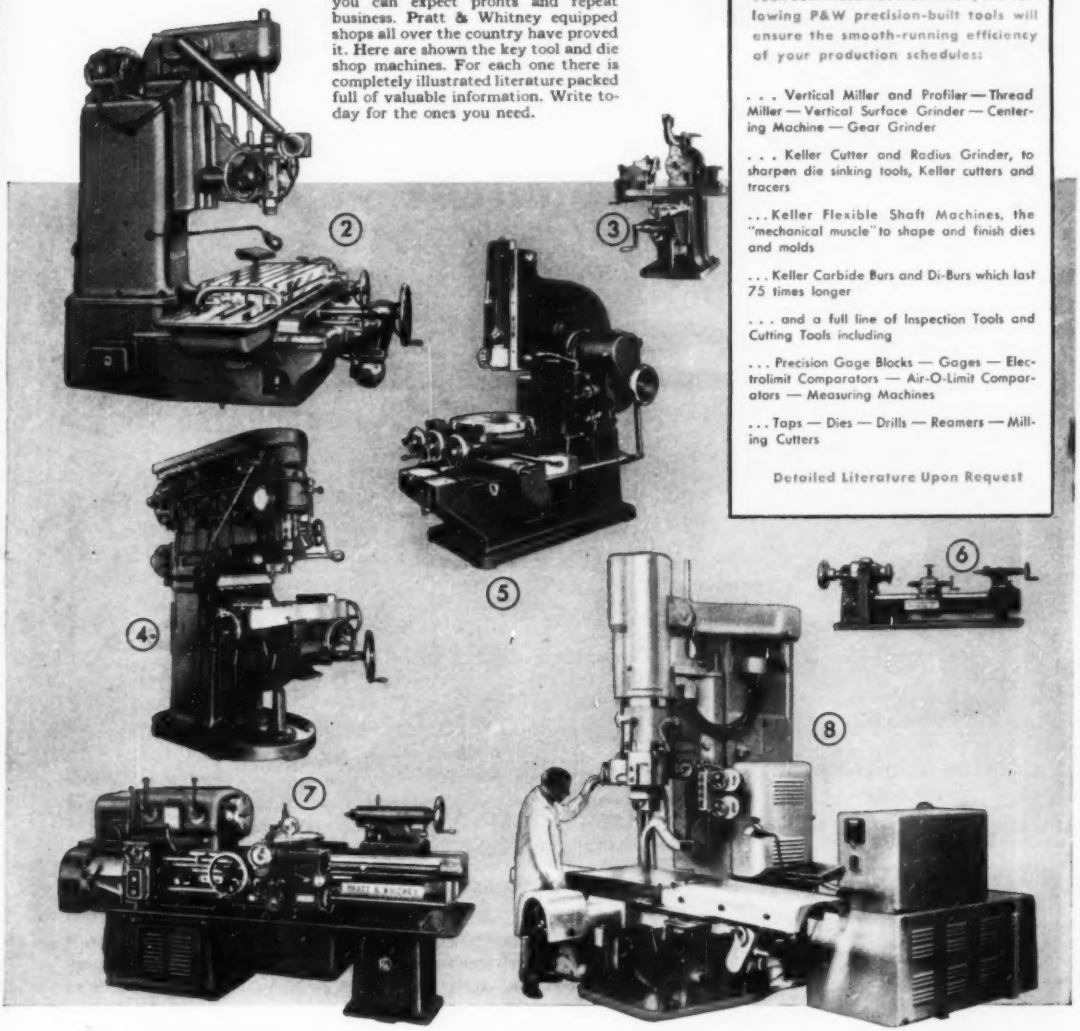
. . . Keller Carbide Burs and Di-Burs which last 75 times longer

. . . and a full line of Inspection Tools and Cutting Tools including

. . . Precision Gage Blocks — Gages — Electrolimit Comparators — Air-O-Limit Comparators — Measuring Machines

. . . Taps — Dies — Drills — Reamers — Milling Cutters

Detailed Literature Upon Request



(2) P&W JIG BORER. Easy-operating, high speed machines, unsurpassed in precision for the toolroom, for production. Integral measuring equipment to locate, bore, and check to "tenths". 3 sizes for all needs.

(3) P&W BENCH MILLER. Incorporates many features and flexibility of larger millers. Easy control of precision for accurate toolroom work. Companion tool to P&W 7" Bench Lathe: units interchangeable from both machines.

(4) P&W DIE SINKER. Plain and Universal models for general die-shop work. Universal machines can take cherrying cuts using standard cutters, without cherrying attachment.

(5) P&W VERTICAL SHAPER. "The handiest machine in the shop." It completes a wide range of irregular-shaped work to close accuracy, usually without fixtures or change in setup.

(6) P&W BENCH LATHE. Essential for accurate work in the toolroom, and efficient for light precision-manufacturing. 7 inch and 10 inch models.

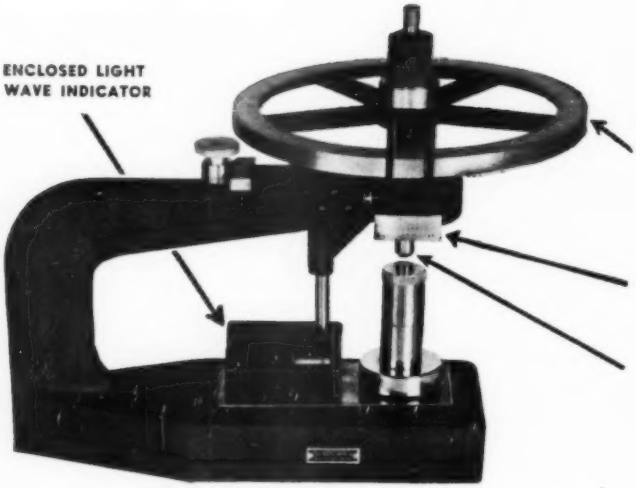
(7) P&W MODEL "C" LATHE. Incorporates the most modern lathe practice, plus P&W precision. It's the standard by which all fine lathes are judged.

(8) P&W JIG GRINDER. Bed, table, locating and checking mechanisms are similar to the Jig Borer. For precision-grinding of straight or tapered holes to extremely fine finishes and "jig borer" accuracy.

investment than the right tools for the job

THE NEW Van Keuren 0 to 3" LIGHT WAVE MICROMETER

will improve your product



CATALOG AND HANDBOOK No. 34

This 208-page volume represents 2 years research sponsored by the Van Keuren Co.

It presents for the first time in history a simple and exact method of measuring screws and worms with wires.

It tells how to measure gears, splines and involute serrations. It is an accepted reference book for measuring problems and methods.

Copies free upon request.

THE Van Keuren Light Wave Micrometer is an instrument of exceptional merit, proven over a period of 15 years. It has enabled hundreds of High School boys and girls to produce and inspect parts to "Hundred Thousandths" of an inch.

The New 0 to 3" Light Wave Micrometer has a ½" diameter, 40 threads per inch micrometer screw, which can be made with greater accuracy and which has 3 times the wearing surface of an ordinary micrometer screw. It has an 8" diameter micrometer wheel, with .0001" graduations 1/10" apart. It has a non parallax, vernier index which enables readings to be made to .00001". It has an index lock. It has carboloy tipped anvil and spindle. It is a sturdy, yet sensitive instrument which weighs 17 pounds. It is a portable measuring machine, built for "Sustained Accuracy."

The Light Wave Micrometer is not a comparator. No gage blocks are needed and no errors creep in from worn blocks. It is a direct source of dependable precision—fast, accurate and profitable.

THE Van Keuren CO., 173 WALTHAM STREET, WATERTOWN, MASS.

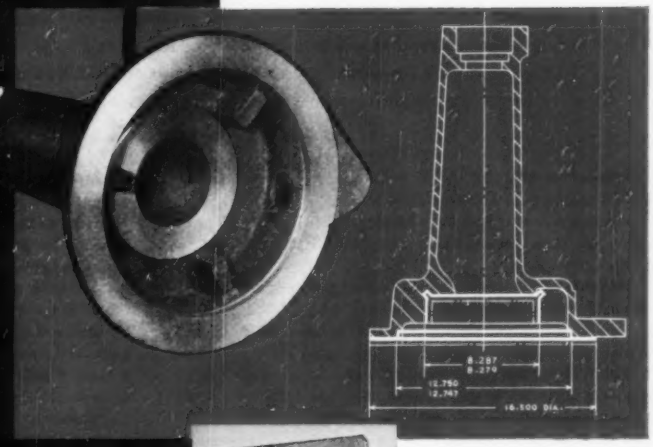
30th YEAR

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Plug Gages • Carboloy Measuring Wires

P&J

SOLVES A

housing problem



REAR axle housing, that is. Note the size... the 45° angular recess . . . the number of operations (12) for rough and precision-finish boring, spading, chamfering, facing . . .

This class of work is a natural for the P&J Automatic; with this Machine tooled the P&J way, you have a most efficient setup for today's high-speed, close-tolerance requirements. When next you figure on the precision-production of quantity duplicate parts, give consideration to P&J's specialized know-how — and the profitable combination of P&J Tooling on P&J Automatics.

The P&J Tooling, to produce the work illustrated, was set up on the 6DRELX, one of the 6D series of P&J Automatics described in this Bulletin. Write for your copy. It may also pay to get a P&J estimate on your prints or sample parts. Either way, there's no obligation.

Potter & Johnston Company

Pawtucket, R. I.

subsidiary of Pratt & Whitney Division Niles-Bement-Pond Company

P&J

PRODUCTION TOOLING HEADQUARTERS

TO HELP YOU PRODUCE MORE . . . BETTER

10 Important Points are Observed in Carborundum's New, Modern Services

To meet industry's requirements for better cost control and increased productivity from abrasive tools, CARBORUNDUM'S new Coated Products Division has established new production and service facilities. All phases of technical development, manufacturing processes, and sales service have been set up within a new, modern plant. Complete co-ordination of all three has been effected.

New standards of quality and performance have been made possible for all products. Abrasive belts . . . discs . . . sheets . . . rolls . . . special forms . . . are produced to meet the most exacting specifications. By providing better results, they will help increase productivity and lower costs in all efficient production lines.

Consider the ten important points observed in CARBORUNDUM'S new, modern services . . . check them against your own requirements for increased productivity and lower costs:

1 INCREASED PRODUCTIVITY is an objective specified for all abrasive products in CARBORUNDUM'S line. Backed by skilled, experienced personnel and the most modern of factories and plant equipment, these coated abrasives are devised and produced to produce *more . . . better*.

2 DECREASED COST is an additional factor of modern production recognized by the staff manufacturing and distributing CARBORUNDUM'S line of Coated Products. Through better performance and greater productivity, these products play their part in reducing production costs.

3 EFFECTIVE TECHNICAL ASSISTANCE is essential to practical, profitable use of the best in abrasive products . . . and CARBORUNDUM'S Coated Abrasive Engineers—at the home office and in the field—have the "know-how" and experience to render helpful co-operation to the customer's production staff.

4 IMPROVED PRODUCTS bring better results in terms of increased output and lower unit costs. That's why CARBORUNDUM'S technical staff and laboratory equipment are busy round the clock . . . checking and improving materials and manufacturing methods. That's why CARBORUNDUM'S specifications are strict and controls of product quality are most rigid.

5 CONSISTENT HIGH QUALITY in coated abrasive products helps keep the sanding or finishing operation running smoothly . . . *all the time*. Technical and manufacturing operations in CARBORUNDUM'S new plant are co-ordinated and controlled in order to produce this essential consistency in the quality of every product in the line.

6 DEPENDABLE PERFORMANCE means assurance that the product will live up to its reputation—give the service required by the user. Therefore, CARBORUNDUM'S entire Coated Products Division organization is pledged to maintenance of the highest standards in both quality and service to the customer.

7 COMPLETE, ADEQUATE STOCKS are essential in order to have Coated Abrasive Products wherever they are needed—whenever they are needed. These requirements are met by CARBORUNDUM'S vast stocks at the main plant and in the District warehouses.

8 TIMELY DELIVERIES result when stocks are complete and adequate in quantity . . . and when they are strategically located as are CARBORUNDUM'S. Solid sales service at all levels helps, too.

9 EFFICIENT ORDER HANDLING means processing, routing, and delivering the customer's order promptly and efficiently. CARBORUNDUM'S sales organization follows this principle of order service from the home office through every District, Distributor, and Jobber organization.

10 HELPFUL PURCHASING SERVICE is transmitted to the user of Coated Abrasive Products by CARBORUNDUM'S competent, experienced, thoroughly informed staff of salesmen, field engineers, and Distributors' and Jobbers' representatives.

TRY THIS new service by CARBORUNDUM'S Coated Products Division. Your inquiry will receive prompt courteous attention . . . and every effort will be extended to help your company obtain better, less costly production rates with the use of coated abrasives. Address The Carborundum Company, Niagara Falls, New York.

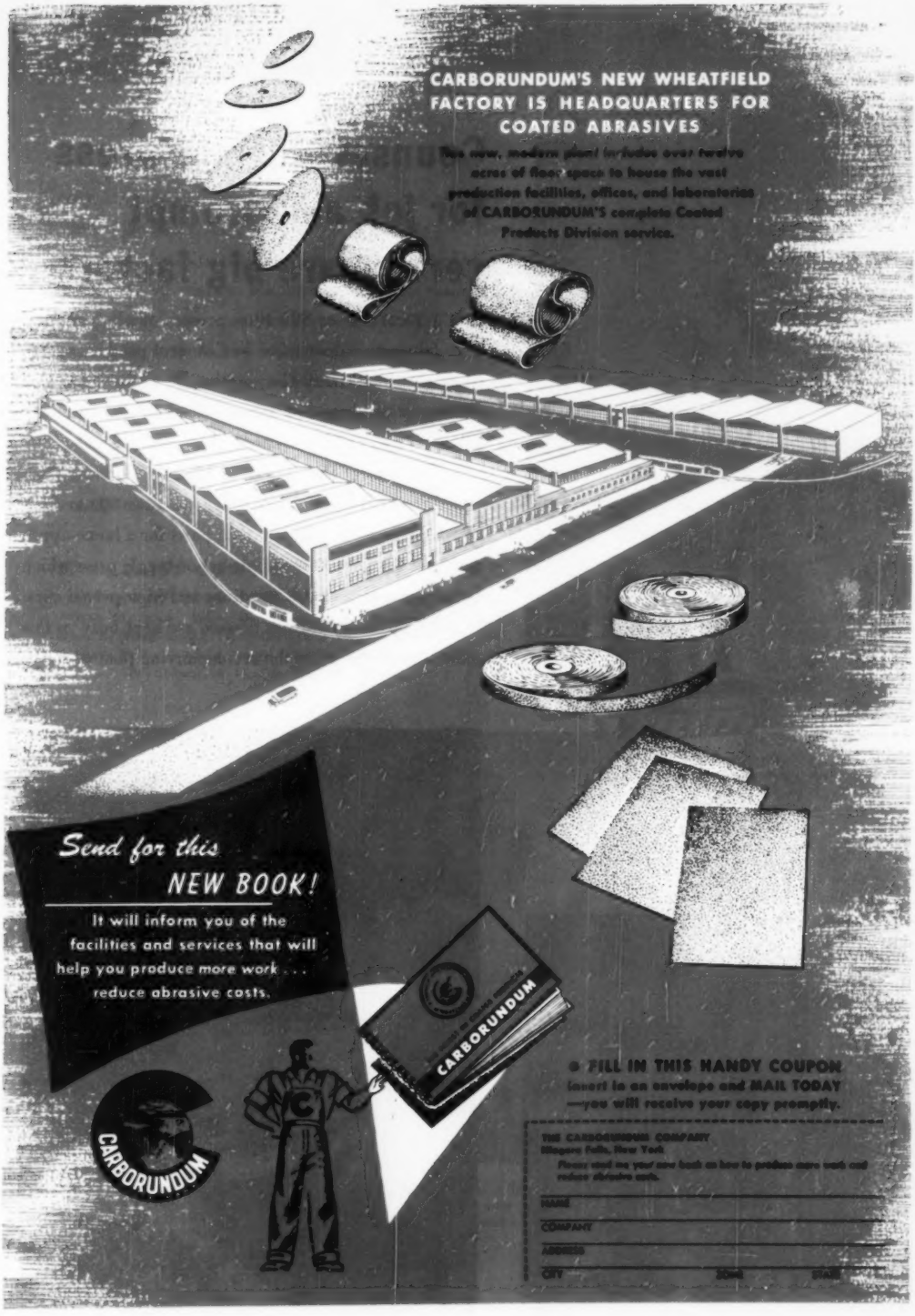
COATED ABRASIVES BY

CARBORUNDUM

TRADE MARK

BELTS • SHEETS • ROLLS • DISCS

"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company


CARBORUNDUM'S NEW WHEATFIELD FACTORY IS HEADQUARTERS FOR COATED ABRASIVES
This new, modern plant includes over twelve acres of floor space to house the vast production facilities, offices, and laboratories of CARBORUNDUM'S complete Coated Products Division service.
Send for this NEW BOOK!
It will inform you of the facilities and services that will help you produce more work . . . reduce abrasive costs.
CARBORUNDUM
CARBORUNDUM
FILL IN THIS HANDY COUPON
Insert in an envelope and MAIL TODAY
—you will receive your copy promptly.
THE CARBORUNDUM COMPANY
Niagara Falls, New York
Please send me your new book on how to produce more work and reduce abrasive costs.
NAME
COMPANY
ADDRESS
CITY
ZONE
STATE

325 BLISS-Built Presses at The

Turret top completely formed with one stroke of Bliss enclosed toggle press after being removed from die.

Counsel on right press for job and prompt service are big factors

IT'S A FACT! Over 325 Bliss presses of all types and sizes fabricate a diversified line of steel products in the plants of the Murray Corporation of America, one of the largest producers of automotive parts and home appliances.

Fully 75% of the presses in Murray's Detroit plant alone are Bliss-Built! They range from the 40-ton Bliss inclinable press shown blanking parts for a home-appliance unit to the 1400-ton triple-action toggle press which forms turret tops of low, medium and high priced cars.

Some of the ways Bliss presses are kept busy in this plant are illustrated in the accompanying photos.

Two of a battery of 13 Bliss straight-side double-crank presses are shown forming pillars.

1400-ton triple-action enclosed toggle presses form turret tops. Press has four points of pressure on blankholder slide; is made of stress-relieved steel.

Murray Corporation of America!

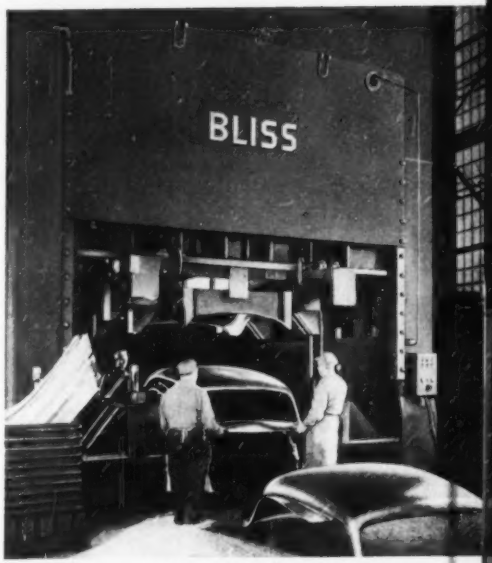
Selection of the right press for the specific job is made only after careful study and recommendations by the Bliss engineering staff, according to Murray's pressroom superintendent. It is this ever-expanding fund of knowledge, over 90 years in the making, that has made Bliss the first choice of stampers the world over. "Ranking next in importance," he says, "is Bliss' prompt service when parts have to be replaced or the presses serviced."

It's another reason why the pressed-metal industry knows that Bliss on a Press Is More Than a Name—*It's a Guarantee!*...why it pays *you* to put your press problem up to Bliss.

E. W. BLISS COMPANY, TOLEDO 7, OHIO

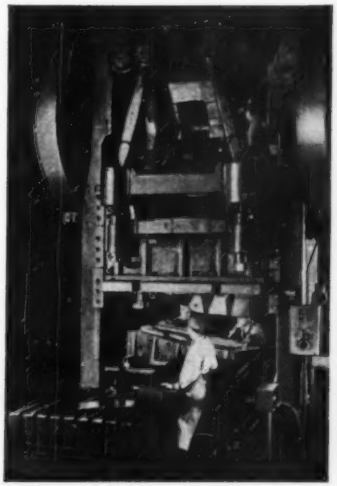
Mechanical and Hydraulic Presses, Rolling Mills, Container Machinery

WORKS AT: Toledo, Salem, Ohio; Hastings, Mich.; Derby, England; St. Ouen sur Seine, France. SALES OFFICES AT: Detroit, Mich.; New York, Rochester, N. Y.; Cleveland, Toledo, Salem, Ohio; Philadelphia, Pittsburgh, Pa.; Chicago, Ill.; New Haven, Conn.; Windsor, Ont.

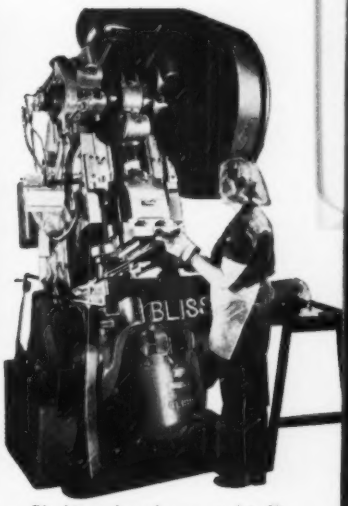


Trimming the turret top in a 4-point enclosed single action press with 160" wide bed. Press has 650 tons capacity. Operation is by electric push-button.

A Bliss adjustable bed press of 40 tons capacity is shown being used for general punch press work.



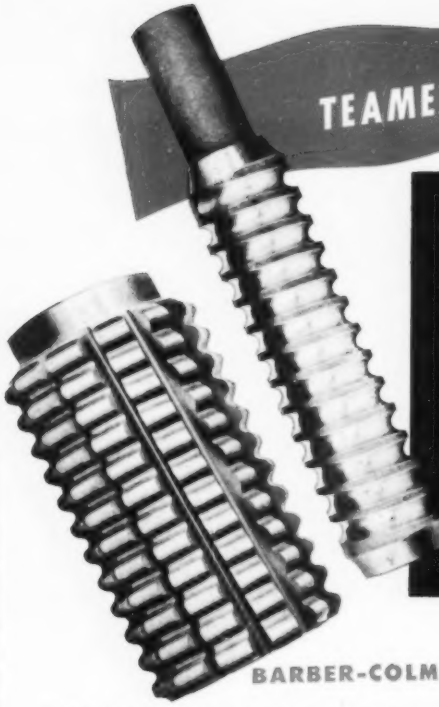
Deep pillars are drawn in Bliss No. 795½ Toggle Press. "The finest drawing press on the market," according to the pressroom superintendent.

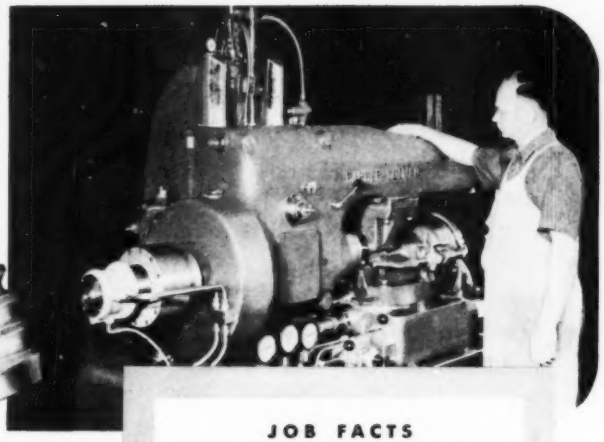


Blanking salvaged scrap steel in No. 21½ Inclinable Press. Die cushion in bed permits shallow drawing.

BLISS BUILDS MORE TYPES AND SIZES OF PRESSES THAN ANY OTHER COMPANY IN THE WORLD

TEAMED FOR *Production!*





JOB FACTS

Operation — Mill Threads on Ball-Nut Steering Worm
Material — 5120 Steel
Cutters — B-C Unground Multiple Thread Cutters, 4" x 4⅛" x 1½"
Machine — B-C No. 14-15
Feed — .640"/minute (axial)
Speed — 160 RPM
Floor-to-Floor — 1.6 minutes per piece
Cutter Life — 7175 pieces

THREAD MILLING CUTTERS AND No. 14-15 HOBBING MACHINE

MILL BALL-NUT STEERING WORMS IN 1.6 MINUTES FLOOR-TO-FLOOR

Engineered-for-the-job, these Barber-Colman Multiple Thread Milling Cutters are "teamed" with a Barber-Colman No. 14-15 Hobbing Machine to give faster output in worm thread milling. Results of this engineered combination are floor-to-floor time per worm of 1.6 minutes, and an average of 300 pieces per cutter sharpening. Cost per worm naturally has been greatly reduced.

For that extra production bonus on milling operations, consult Barber-Colman engineers. Their experience with cutting tools engineered-for-the-job can save both time and money in getting the job done right.

PRODUCTION GUIDE

Facts and figures on a variety of milling cutter applications. Get your free copy. Ask for File No. 4125

Barber-Colman Company

GENERAL OFFICES AND PLANT, 4125 LOOMIS ST., ROCKFORD, ILLINOIS, U. S. A.

BARBER COLMAN

THE GREENFIELD STORY

"Gun"

CHIPS clogging in the flutes of taps are the No. 1 cause of breakage. This happens particularly when the metal is "stringy" and the tap is being used in a machine operating at high speeds.

"Greenfield" engineers licked that problem years ago in through hole tapping by inventing a tap that shot the chips out ahead as it cut a thread. *They named it the "Gun" Tap.* The advantages are many. The body of the tap can be thicker and stronger. The shearing action of the tap takes less power. And the threads are more accurate.

Perhaps you have been using "Gun" Taps for years and this is an old story to you. If not, you may be interested in learning more about "Gun" Taps from your local "Greenfield" Distributor or by writing direct to "Greenfield".

GTD

GREENFIELD TAP and DIE CORPORATION
Greenfield, Massachusetts

and

GEO METRIC

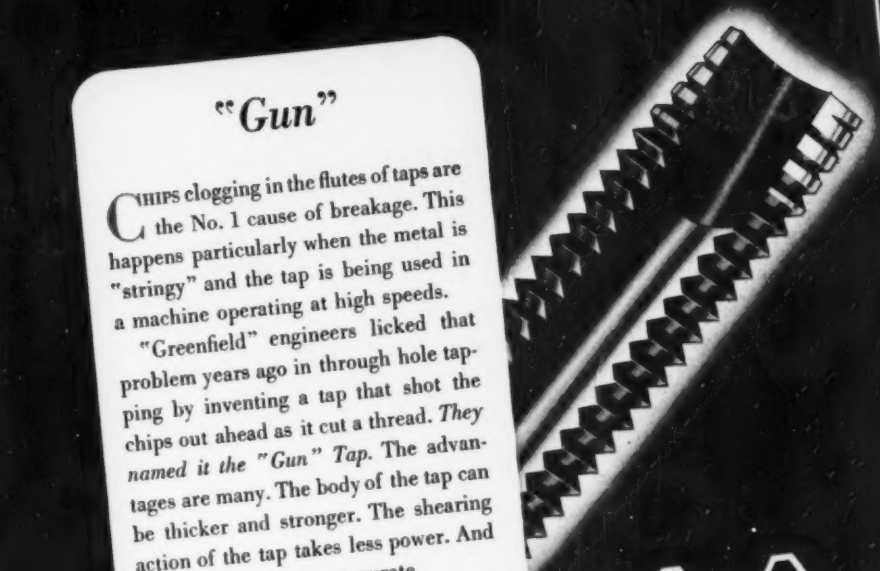
THE GEOMETRIC TOOL CO.
New Haven 15, Connecticut

and

GTD AMPCO

AMPCO TWIST DRILL CORP.
Jackson, Michigan

Divisions of Greenfield Tap and Die Corporation



GTD

GREENFIELD

Be Sure
Buy "Greenfield"

Precision **THREADING TOOLS**

Solid Adjustable

Class SJ Tap and Chasers

Where the time for backing out is unimportant, or where space is limited the SJ Tap is recommended.

* *

Available in eleven sizes with a cutting range from 1 5/16" to 8½".

* *

GEOMETRIC also makes a complete line of Rotary and Stationary Self Opening . . . and Solid Adjustable Die Heads—and Collapsing Taps—and GEOMETRIC Chasers.

"Be Sure . . . Buy Geometric"

THE

GEOMETRIC

TOOL COMPANY, NEW HAVEN 15, CONNECTICUT

GTD

GTD AMPCO

NO. 1 ELECTRIC
⅝" BAR CAPACITY, 11" SWING

NO. 2 ELECTRIC
1" BAR CAPACITY, 14" SWING

NO. 2 ALL GEARED HEAD
1" BAR CAPACITY, 14" SWING

NO. 2 ELECTRO-CYCLE
1" BAR CAPACITY, 14" SWING

NO. 3 UNIVERSAL
1½" BAR CAPACITY, 15⅜" SWING

1-A UNIVERSAL HEAVY DUTY
2⅛" OR 3" BAR CAPACITY, 16¼" SWING

NO. 3 ELECTRO-CYCLE
1½" BAR CAPACITY, 15⅜" SWING

2-A UNIVERSAL HEAVY DUTY
3⅛" BAR CAPACITY, 20" SWING

16" ELECTRO-CYCLE
1½" BAR CAPACITY, 16⅞" SWING

3-A UNIVERSAL HEAVY DUTY
4⅛" OR 6" BAR CAPACITY, 23½" SWING

NO. 4 UNIVERSAL
2" BAR CAPACITY, 18⅞" SWING

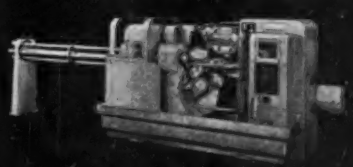
NO. 10 TAPPING MACHINE
CAPACITY 0-80 TO 10-24

NO. 11 TAPPING MACHINE
CAPACITY 8-36 TO ⅞"

NO. 12 TAPPING MACHINE
CAPACITY ⅜" TO 2½"

4-A UNIVERSAL HEAVY DUTY
8", 9" OR 12" BAR CAPACITY, 28¼" SWING

NO. 5 UNIVERSAL
2⅛" BAR CAPACITY, 20" SWING



5-SPINDLE AUTOMATIC BAR MACHINES
1⅜" STANDARD BAR CAPACITY
2¼" OVERSIZE CAPACITY

5-SPINDLE AUTOMATIC CHUCKING MACHINE
6" SWING

1-AC SINGLE SPINDLE AUTOMATIC CHUCKING
MACHINE 8" OR 10" CHUCK, 6" TURNING LENGTH

Warner & Swasey
Sells one thing...
INCREASED PRODUCTION

• When you buy a Warner & Swasey, you buy increased production—greater output at lower cost.

The power, rigidity, accuracy, and ease of operation built into each Warner & Swasey all add up to a greater return on your investment.

You can machine it better, faster, for less ...with a Warner & Swasey

TURRET LATHES, MULTIPLE & SINGLE SPINDLE AUTOMATICS, PRECISION TAPPING AND THREADING MACHINES

WARNER & SWASEY
Machine Tools
Cleveland

CUT HEAVY *and* LIGHT STOCK *Both*

NIAGARA

You don't have to adjust knife clearance on Niagara Power Squaring Shears every time you cut a different thickness of stock! Niagara capacity ratings are maximum capacity ratings, and they cut any thickness of stock up to their top rating WITHOUT TINKERING WITH THE KNIFE ADJUSTMENT.

And to prove it, look at the photograph at right...one man is cutting a 20 gage sheet and the other is cutting 5/8" plate BOTH AT THE SAME TIME, AND WITH THE SAME KNIFE ADJUSTMENT, AND WITH THE SAME GOOD RESULTS.

This is done daily in our own plant on our own work. We gladly demonstrate.

It speaks for Niagara design, Niagara rigidity, Niagara strength and the recognized ability of Niagara shears to deliver more working strokes per hour.

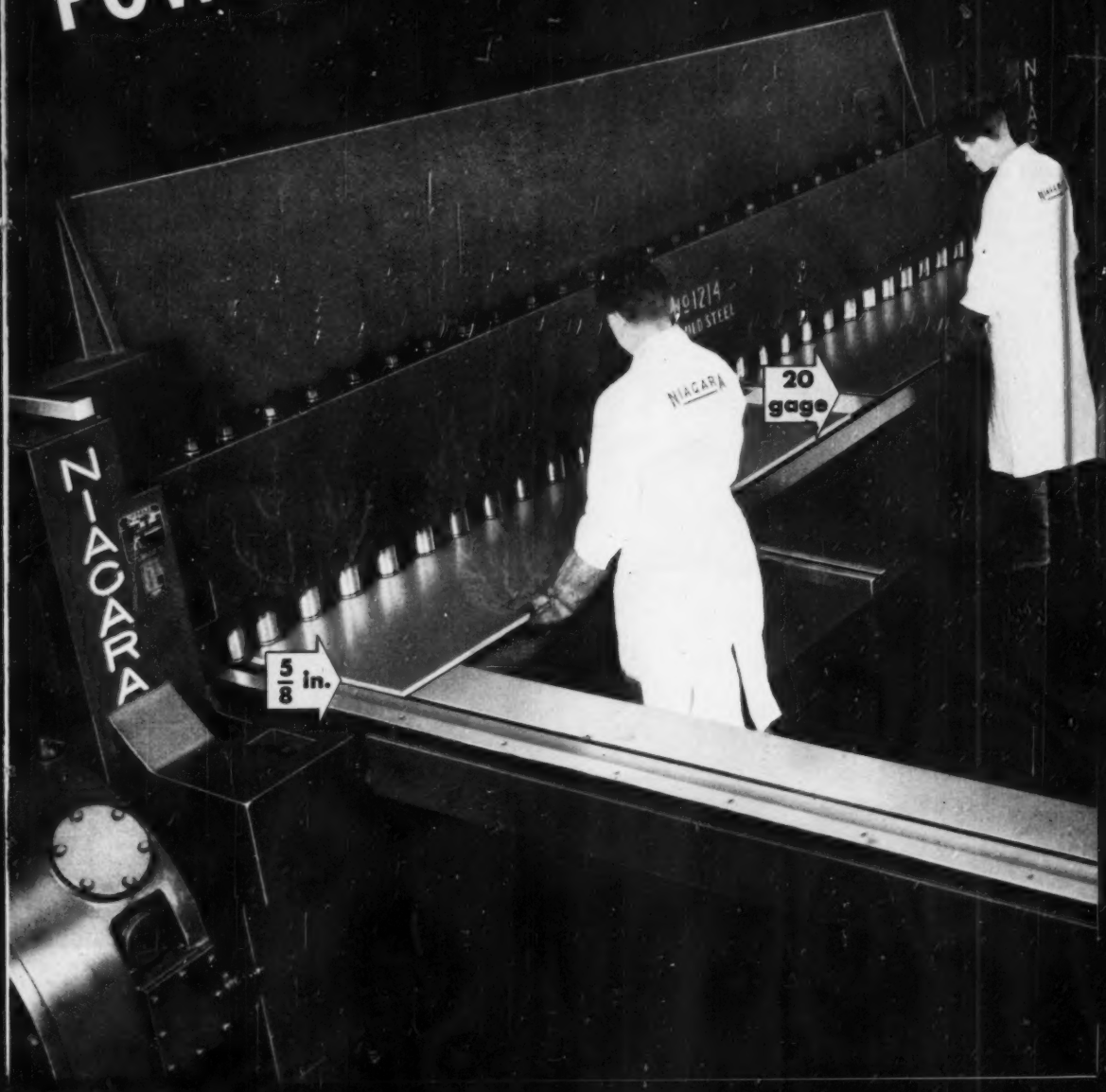
Write for bulletin.

NIAGARA MACHINE AND TOOL WORKS, BUFFALO 11, NEW YORK

DISTRICT OFFICES: DETROIT, CLEVELAND, NEW YORK

at the Same Time on

POWER SQUARING SHEARS



The Word Is Getting Around: THESE TIME DRASTICALLY—

Here's picture-story of how 43% reduction in floor-to-floor time was accomplished on this job. Simple vise type fixture holds 4 workpieces at a time. Operator takes only few minutes to set up for *Mono-Lever* controlled automatic cycle . . . for rapid traverse to point of cut, feed through cut, rapid traverse reverse to starting point and stop for reload. Note that the operator engages *Mono-Lever* control *once* — at start of each cutting cycle. No other attention is necessary. While machine is running operator inspects and burrs finished pieces.

MACHINES SLASH IDLE 43% GAIN ON THIS JOB

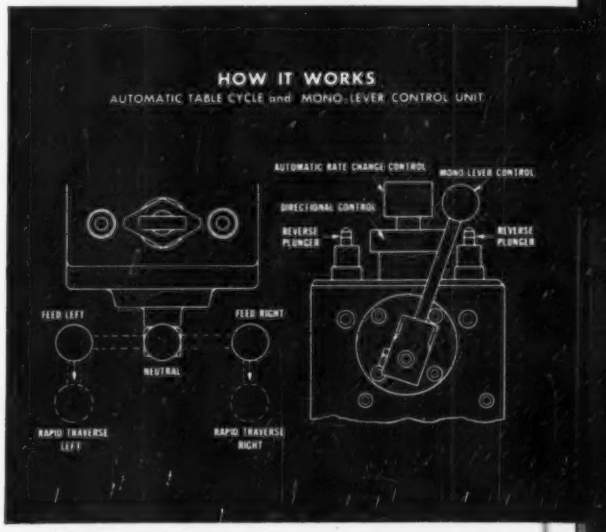
YOU too, can make big time savings in the floor-to-floor cycle on milled parts. Other plants are doing it *now* — reporting savings of 16—31—43—96%. How? With new Kearney & Trecker knee-type milling machines with *Mono-Lever* control and automatic table cycle.

It will pay you to investigate these machines. See how a single lever controls all table movements . . . how *Mono-Lever* control works independently or with automatic table cycle to reduce idle cutter time — to turn out jobs faster, better — to stop operator fatigue. See how these versatile knee-type machines give you the productive capacity of bed type equipment.

Equally important — there's a machine to fit your jobs. You neither *over-buy* nor *under-buy* — you buy *right* when you choose from 56 machines in this line.

For startling facts about these machines as applied to your milling work, consult a Kearney & Trecker Sales Representative today. Schooled in the "know-how", he's at your service. Contact him or write Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wis.

KEARNEY & TRECKER
MILWAUKEE
MACHINE TOOLS



THINK OF IT! Now you can have all the advantages of this great cost-cutting feature plus the all-around versatility of general purpose, knee-type machines . . . faster, easier control for greater production with less operator fatigue.

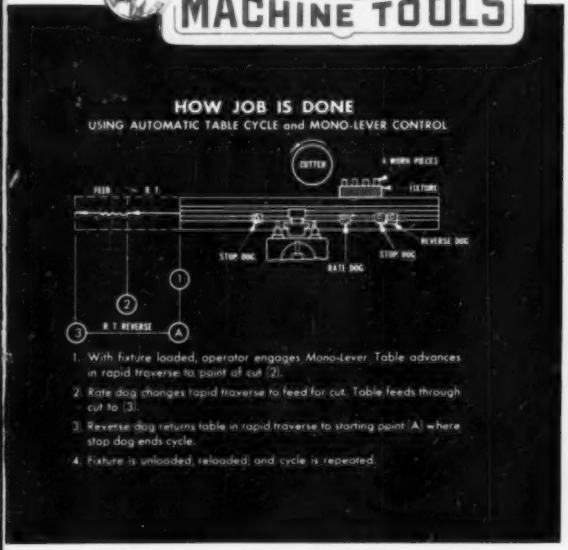
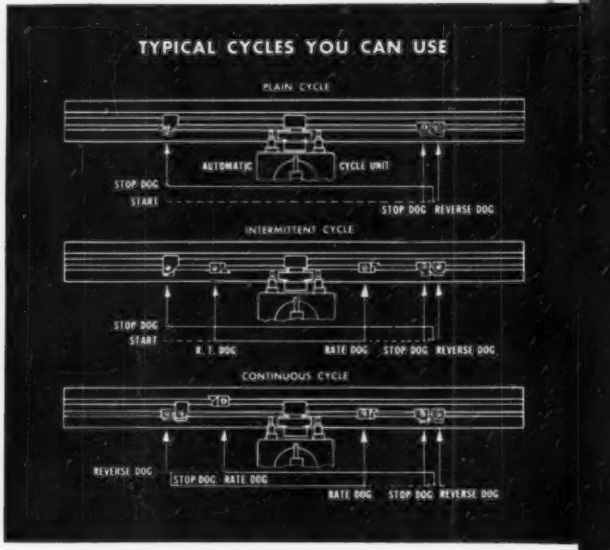

HOW JOB IS DONE
USING AUTOMATIC TABLE CYCLE and MONO-LEVER CONTROL
CUTTER
WORK PIECES
FIXTURE
FEED
R. T.
REVERSE DOG
STOP DOG
RATE DOG
STOP DOG
1
2
3
R. T. REVERSE
A
1. With fixture loaded, operator engages Mono-Lever. Table advances in rapid traverse to point of cut (2).
2. Rate dog changes rapid traverse to feed for cut. Table feeds through cut to (3).
3. Reverse dog returns table in rapid traverse to starting point (A) where stop dog ends cycle.
4. Fixture is unloaded, reloaded, and cycle is repeated.

DIAGRAM above shows how machine with new *Mono-Lever* control mills workpieces without operator's constant attention. Note how quickly control engages feed from rapid traverse — eliminating hand "inching" to cut — leaving operator free to inspect and burr workpieces.



THREE DIFFERENT TYPICAL CYCLES to accommodate various job setups. Using the completely automatic cycle feature effects savings of up to 31% for lots of 10 or more pieces. Cycle can be set for loading and unloading time — and can be reversed in feed or rapid traverse.

YOU CAN BE SURE.. IF IT'S
Westinghouse

NOW···

LIFE-LINE

slashes a-c motor upkeep costs

Here's how Life-Line motors can save you half the upkeep cost, and more.

A recent survey of 114 large motor users—operating 131,626 a-c motors of 1 to 50 hp—shows how much motors *really* cost when you figure actual "Life Cost".

The survey shows that the yearly average cost of periodically lubricated motors was $270 for every hundred motors installed.

On lubrication cost alone, Life-Line motors saved this $270. That's because Life-Line requires no periodic lubrication—no added lubrication of any kind.

The survey also indicates that the yearly outage cost per hundred motors, for repairs and lost machine and man-hours, was $960.

The record of 500,000 Life-Line motors in service, to date, indicates a failure rate averaging less than half that of conventional motors covered by this survey. This means over 50% indicated reduction in motor outage costs—in short, a possible saving of $480 per year with Life-Line.

Add these savings—$270 for lubrication plus $480 for outages—and the result is $750 per hundred motors per year.

Can you afford to pass up savings like these? Get the facts on the savings possible in your plant. Ask your nearby Westinghouse representative for a copy of B-4321 "How to Cut Motor Costs $750". Or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-21508-D

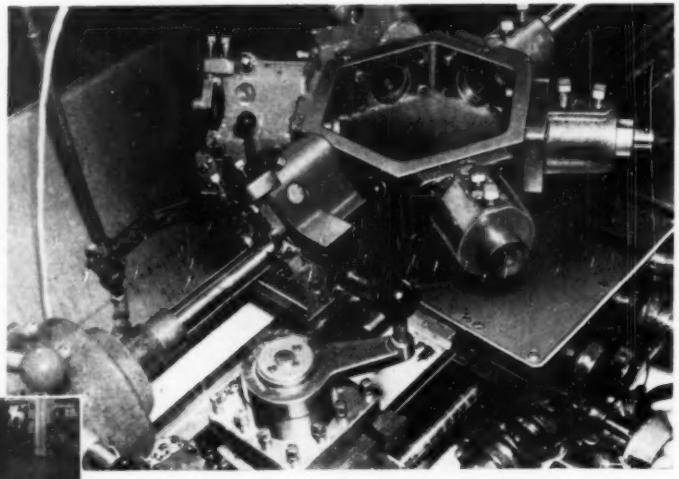
Westinghouse
Life-Line
Motors

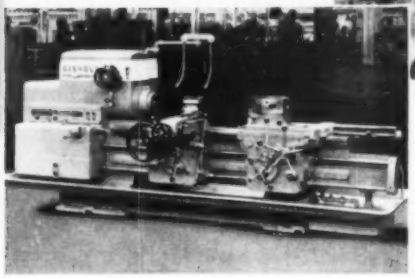
SAVING
BY ELIMINATING LUBRICATION
$270
SAVING INDICATED
BY REDUCTION OF MOTOR OUTAGES
$480
TOTAL SAVING
PER YEAR PER 100 MOTORS
$750
DO NOT
LUBRICATE

take shaft jobs Like This:

they take less time on GISHOLT TURRET LATHES

Yes, even in lots as small as 5 or 10 parts, you can't beat turret lathes on this kind of work. Parts are machined complete in 2 operations—total time is less than 4 min.





THE GISHOLT ROUND TABLE

represents the collective experience of specialists in the machining, surface finishing and balancing of round and partly round parts. Your problems are welcomed here.

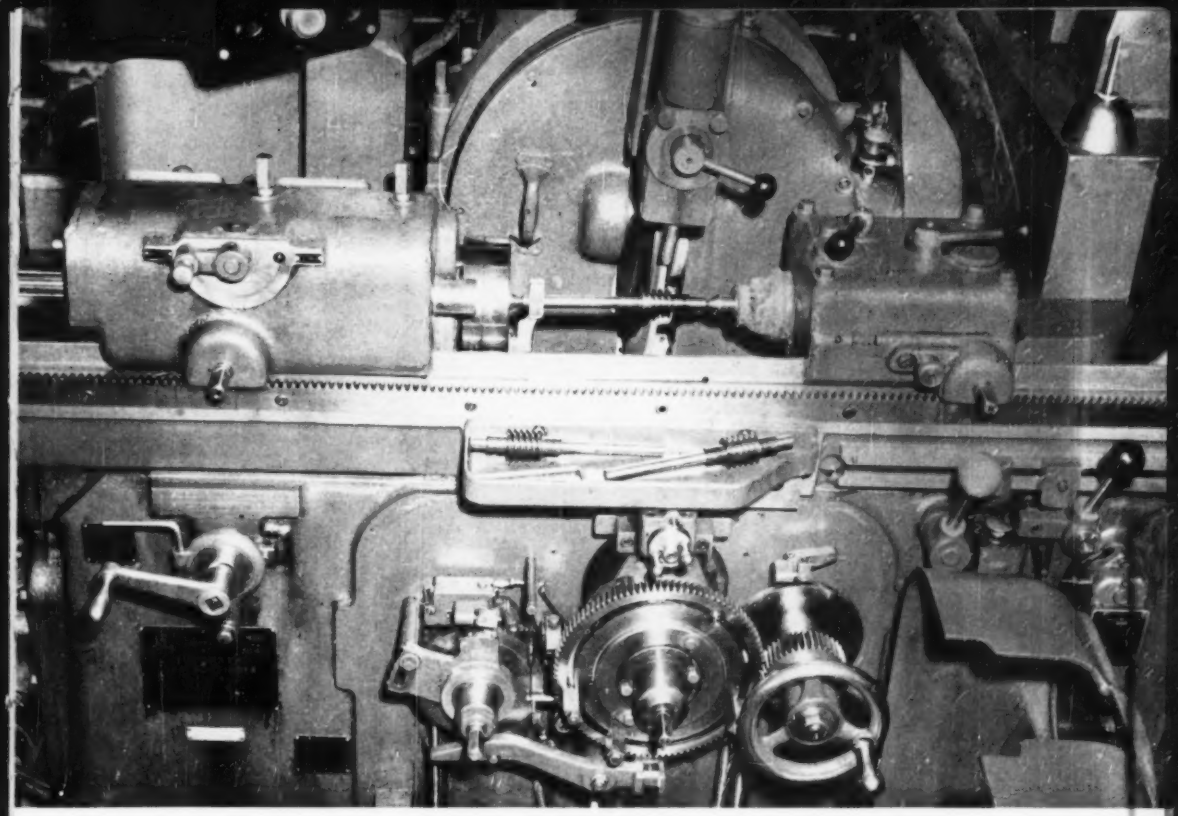
no extra equipment needed!

With no more than your standard bar equipment, you're all set to cut machining costs on shafts like these. No previous operations . . . such as cutting to length or centering . . . are necessary. And with *two or more tools* from turret and side carriage, you have the basic advantage of turret lathe economy—the time saving that means lower costs.

Before you turn to extra equipment or special attachments, look into the possibilities of doing the job the quick and easy way on Gisholt Turret Lathes. Gisholt engineers will gladly help you.

GISHOLT MACHINE COMPANY
MADISON 10, WISCONSIN

TURRET LATHES · AUTOMATIC LATHES · SUPERFINISHERS · BALANCERS · SPECIAL MACHINES



Turns tables on worm-grinding trouble...

OPERATION: Grinding

PART: Triple-lead worm gear

MATERIAL: SAE 4140 heat-treated steel of 46-50 Rockwell C hardness

MACHINE: Jones & Lamson Thread Grinder

BURNING OF GEAR SURFACES, on the grinding operation described above, troubled the Acme Gear Company, of Milwaukee, Wisconsin. The company began a search for a cutting oil that would prevent such burning.

Various cutting oils were tried. Of these, one product not only stopped burning troubles but brought great all-around improvement. The product: Superla Thread Grinding Oil A. The results: grinding speed increased 20%, production boosted to 10 pieces per hour, finish held to between 14 and 20 microinches.

Superla Thread Grinding Oil

Results—like those above—have shown, again and again, that Standard Oil's cutting oils and coolants reduce machining costs to a minimum, raise product quality to a maximum. That's why you can count on those benefits for your operations. A Standard Oil Cutting Oil Engineer will help you obtain them.

Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD OIL COMPANY (INDIANA) STANDARD

THE SHOP FOREMAN of Hart Pressed Steel Corp., Elkhart, Indiana, exposes the clean metal surface beneath a coating of Stanorust 1-XC Rust Preventive. The die shown has been protected against rust under severe outdoor conditions for over a year by Stanorust 1-XC.

How to prevent rust under severe outdoor conditions . . .

Rain, snow, heat, cold—plus coal soot from passing locomotives—could be expected to produce serious rust troubles in outside storage. The elements did, indeed, cause difficulties for the Hart Pressed Steel Corp., Elkhart, Indiana, which owns the truck and trailer dies shown above. Despite coatings of heavy oil, rusting was so severe that cleaning a die required at least three hours.

The problem was laid before a Standard Oil Lubrication Engineer. He pointed out that, to withstand severe outdoor exposure, a rust preventive with special qualities is needed. At his suggestion, the dies were coated with Stanorust 1-XC, a rust preventive especially developed for severe outdoor service.

Stanorust Rust Preventives

Use of Stanorust instead of the less expensive oil has made savings for this company. Many of the dies have been exposed to the weather for over a year, yet Stanorust has kept them completely protected against rust. A die can now be cleaned and returned to service in a matter of ten minutes, as compared with the three hours previously required.

The new and improved Stanorusts can mean big savings for you through more economical applications, better rust protection. Their advantages and applications are described in the booklet illustrated at the right. Here also is help for you in analyzing your rust-prevention problems and needs. Why not write for your copy today?

Simply address your letter to Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD OIL COMPANY (INDIANA)

STANDARD

HOW TO DEODORIZE A JOB . . .

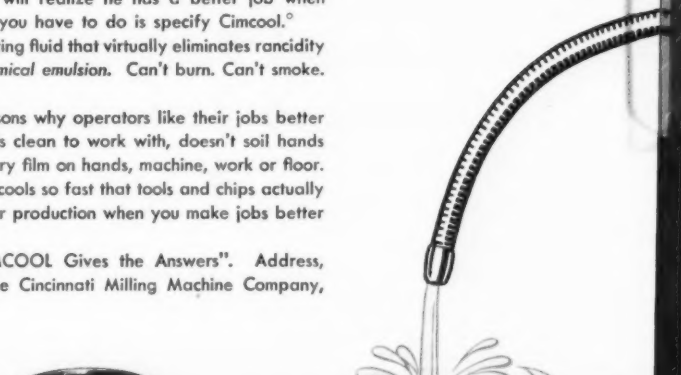
Every operator in your shop will realize he has a better job when you take the odor out of it. And all you have to do is specify Cimcool.°

Cimcool is the revolutionary cutting fluid that virtually eliminates rancidity even in the hottest weather. It's a *chemical emulsion.* Can't burn. Can't smoke. Has no objectionable odor of its own.

And those aren't the only reasons why operators like their jobs better when Cimcool is on the job. Cimcool is clean to work with, doesn't soil hands or clothes. Leaves no hazardous slippery film on hands, machine, work or floor. Contains no skin irritants. And Cimcool cools so fast that tools and chips actually stay cool to the touch. You'll get better production when you make jobs better with Cimcool!

Write for free booklet, "CIMCOOL Gives the Answers". Address, Sales Manager CIMCOOL Division, The Cincinnati Milling Machine Company, Cincinnati 9, Ohio.

°Trade Mark Reg. U. S. Pat. Off.



A Production-Proved Product of
THE CINCINNATI MILLING MACHINE CO.

for 85%
OF ALL METAL CUTTING JOBS

The SAFETY-CIRCLE

The Allis-Chalmers *SAFETY-CIRCLE* is the frame and ends of heavy cast iron that completely surround and protect the working parts of the *SAFETY-CIRCLE* motor.

SAFETY-CIRCLE means

★ All-Around Protection ★ Low Maintenance ★ Dependable Performance

A-2690

THE *SAFETY-CIRCLE* MOTOR is protected all around against those four great motor killers — corrosion . . . distortion . . . friction . . . foreign matter. The frame is of cast iron, the most corrosion-resistant material for this purpose.

The strength and stiffness of the cast iron is supplemented by ribbing and bracing to maintain alignment and prevent distortion. Ball bearings are lubricated and sealed at the factory. They require no attention for years. End brackets are drip-proof at no premium.

SAFETY-CIRCLE motors are fully protected inside, too. Multiple-dipped and multiple-baked stator plus extra inter-phase insulation provide extra protection against electrical breakdown.

With *SAFETY-CIRCLE* protection outside and protected working parts inside, you can count on years of trouble-free, low cost power.

For complete details on *SAFETY-CIRCLE* advantages, see your A-C Authorized Dealer or Sales Office or write for Bulletin 51B6210B. Stocked in sizes 1 to 20 hp. *SAFETY-CIRCLE*, *Texrope* and *Vari-Pitch* are Allis-Chalmers trademarks.

ALLIS-CHALMERS, 999A SO. 70 ST.
MILWAUKEE, WIS.

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE — Belts in all sizes and sections, standard and Vari-Pitch sheaves, speed changers.

PUMPS — Integral motor and coupled types. Sizes and ratings to 2500 GPM.

ALLIS-CHALMERS

Start Now To *Simplify* YOUR Press Operations

order

DANLY Bolster Plates Built to "J.I.C." Standards

QUICK FACTS about DANLY Bolsters

★ Types and sizes built to meet any specification

★ Fast delivery at cost-saving prices

★ Machined with slug holes of any size or shape

★ Available in semi-steel or all-steel, stress-relieved

★ Efficiently machined on modern equipment to precision tolerances

Engineering Assistance

Get in touch with Danly Branch Office nearest you for any engineering assistance. Branches are located in

Chicago
Cleveland
Dayton
Detroit
Grand Rapids
Los Angeles
Milwaukee
Philadelphia
Rochester, New York
Long Island City, New York
(Consult your Telephone Directory)

New Standards Provide Greater Interchangeability of Setups

The Joint Industry Conference of American Manufacturers have recently approved a set of standards covering press bolster plates. This progressive step aids the die designer and also offers important interchangeability between presses when "J.I.C." standards are followed. Die pin and "T" slot locations follow the same pattern irrespective of press capacity or bed area.

"J.I.C." bolsters cost less from Danly: Complete plant facilities include special tooling for the production of "J.I.C." bolsters. This results in cost savings that will enable you to effect a standardization program as economical as possible. Danly's up-to-date production methods cut setup and handling time to give you faster and better service on precision machined bolster plates. Write or call for quotations.

Free LITERATURE ON *"J.I.C."* STANDARDS

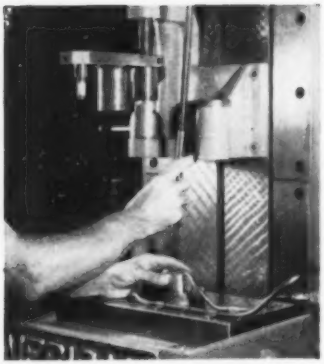
Danly will be glad to send you free literature covering data relating to the standards adopted by the Joint Industry Conference including the guide for determining bolster plate thickness. Folder also outlines data required for quotations.

DANLY MACHINE SPECIALTIES, INC.
2100 SOUTH 52nd AVENUE — CHICAGO 50, ILLINOIS

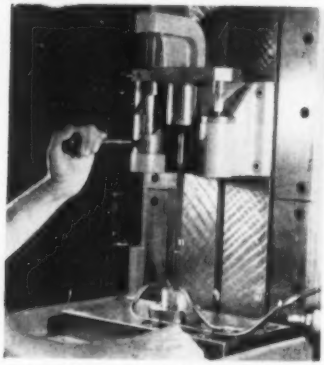
DANLY

OVER 25 YEARS OF DEPENDABLE SERVICE TO THE STAMPING INDUSTRY

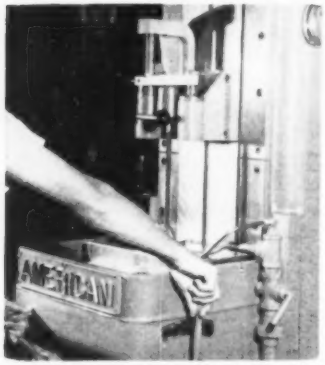
MECHANICAL PRESSES AND PRESS EQUIPMENT



Part locates in work nest—broach shank is manually placed through part into pull head, then . . .



leaf assembly is swung into position with guide bushing over broach rear pilot. Cycle . . .



is started manually. At end of stroke, guide is swung out—part is unloaded—broach is then returned to up position. Production rate—100 per hour net.

American 3-WAY MACHINE

plus

American ENGINEERING

SCORES AGAIN!

Common practice says broach the hole first . . . then machine the O.D. But here was the exception — a case where it was necessary to broach an involute spline located from a previously machined O.D. By mounting a special yoke type guide assembly directly to the ram face of the American T-6-24, American engineers were able to accomplish this operation while maintaining exceptional broach alignment and minimum broach drift throughout the broaching stroke.

American 3-Way broaching machines are general purpose machines that can be used efficiently on many classes of work. They are adaptable to internal broaching (both push down and pull) and surface broaching. They may be equipped with more than one station, multiple broaches and electrical control. Highly productive, easily convertible as requirements change, American 3-Way broaching machines provide the plus values that make a good investment better.

Finish broaching an involute spline through the center of Pump Rotor performed on American T-6-24 3-Way type Vertical Hydraulic Broaching machine arranged for pull down operation.

INVESTIGATE — THE PLUS VALUE FEATURES OF AMERICAN 3-WAY MACHINES

Write for Circular 100. It describes in detail the design features that make the American 3-Way broaching machines a profitable investment. Fully illustrated and FREE. Address Department A.

American BROACH & MACHINE CO.

A DIVISION OF SUNDSTRAND MACHINE TOOL CO.

ANN ARBOR, MICHIGAN

See American First — for the Best in Broaching Tools, Broaching Machines, Special Machinery

MEMO

How to sell your Appropriations Committee

the best way to avoid expensive handling systems

Economists and industrial engineers predict that the last great unexplored area for lowered factory costs will be found in the field of materials handling. We believe they are right. But economies from laborsaving handling systems are only *part* of the answer.

It's equally important to *reduce the need for handling*—by using fewer machines and keeping them loaded. That's where Acme-Gridley bar and chucking automatics can help.

Unless your appropriations committee is fully familiar with the versatility of modern Acme-Gridleys—and their ability to give you more good pieces in the pan, economically, *around the clock*—they may overlook this lucrative way of cutting costs. Below is printed one typical case study. Could you use a file of similar examples, to help prove your point? Ask us for them.

CUT THIS OUT FOR USE WHEN YOUR APPROPRIATIONS COMMITTEE WANTS PROOF

AN ACME-GRIDLEY CERTIFIED CASE STUDY

THIS IS WHAT HAPPENED:

PART TURNED—Brass Magnet Shaft

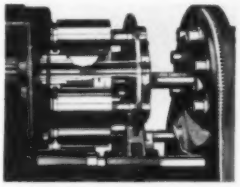
MACHINE—9/16" Acme-Gridley RA 6-Spindle Bar Automatic

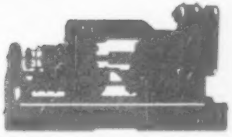
OPERATIONS PERFORMED—Fifteen, to machine part complete, including a square hole—and counterbore of large end, plus pickoff

TIME—5 seconds

AND HERE'S ONE IMPORTANT REASON:

Typical of many design features that permit Acme-Gridley automatics to maintain accuracy under conditions of sustained heavy-duty operation is the stock reel disc, independently operated through a separate shaft and gear. With this arrangement, the load is not thrown on the spindle carrier while indexing; the tendency to spindle whipping is eliminated; there is no excessive wear on spindle bearings and carrier.





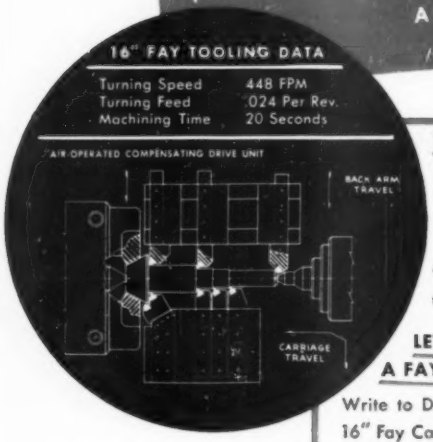
THE NATIONAL ACME COMPANY

170 EAST 131st STREET • CLEVELAND 8, OHIO

ACME-GRIDLEY BAR and CHUCKING AUTOMATICS built in 4, 6 and 8-spindle styles, maintain accuracy at the highest spindle speeds and fastest feeds modern cutting tools can withstand.

DO YOU COMPETE AGAINST PRODUCTION LIKE THIS ?

20 Seconds
MACHINING TIME ON A 16"
FAY AUTOMATIC LATHE



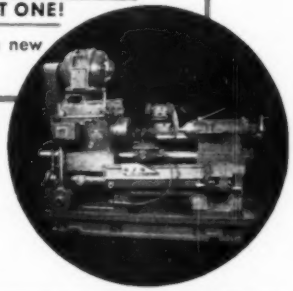
YOU CAN'T BEAT A 16" FAY ON A JOB LIKE THIS!

. . . Tough SAE-4620 Forgings
. . . ¼" of stock removed on a side
. . . 38 HP Transmitted at 448 FPM!

Only a Fay has the speed, power and rigidity to hog metal at such a rate!

LET US SHOW YOU WHY IT'S CHEAPER TO OWN A FAY THAN TO COMPETE AGAINST ONE!

Write to Dept. 710 FF for your copy of the new 16" Fay Catalog.



DESIGNED to lower every turning cost. ***BUILT*** for maximum production with either carbide or high speed steel tools. ***POWERED*** to produce more chips per tool, more pieces per hour, more profit per job than any automatic lathe of comparable size.

Fay Lathe Division

J&L JONES & LAMSON MACHINE COMPANY
Springfield, Vermont, U.S.A.

MACHINE TOOL CRAFTSMEN SINCE 1835

AO PANORAM Goggles

Workers have a "first row orchestra" view of the work with "Panoram"

AO's Wide-Vision Safety Goggle!

The AO Panoram Goggle is available in the following models:

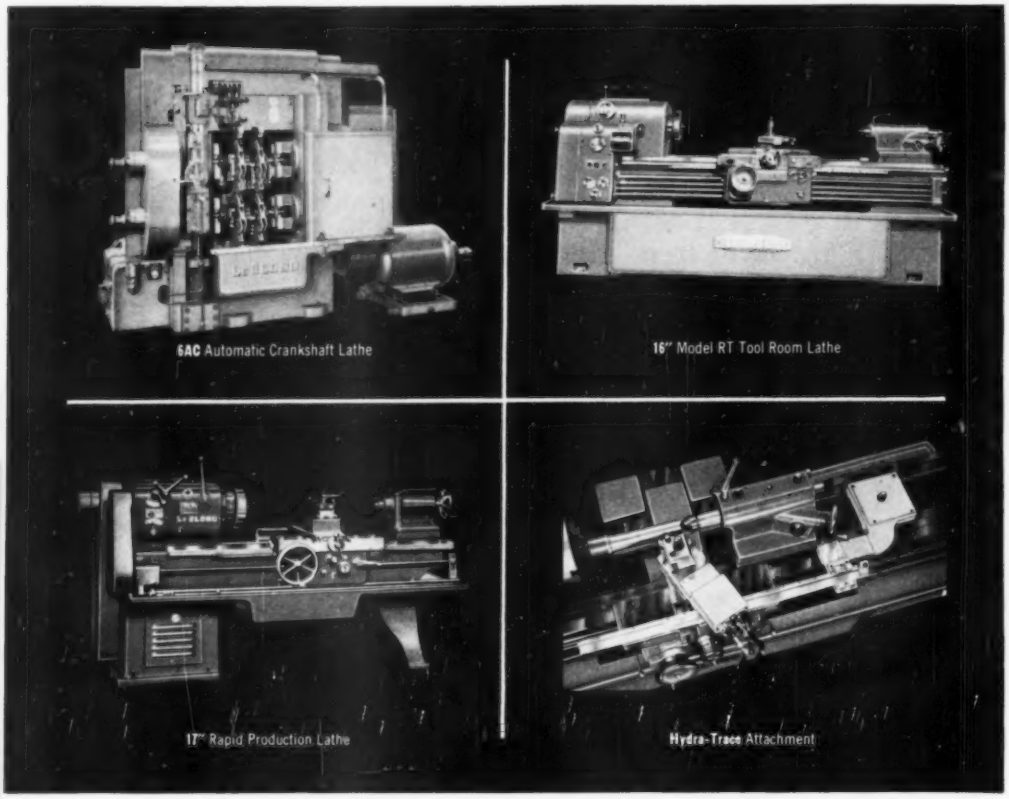
NO. 600 — Clear Frame, Clear Lenses
NO. 601 — Clear Frame, Green Lenses
NO. 602 — Green Frame, Clear Lenses
NO. 603 — Green Frame, Green Lenses

Seeing area is at a maximum in this wide-vision goggle. Worn over prescription glasses or worn alone, its plastic frame, eyecups and replaceable lenses in either clear or green acetate provide snug, face-conforming protection. Eyecups vented at top and bottom assure ample ventilation and minimize clouding of lenses. Bridge is the floating saddle type that fits comfortably without pressure. Elastic headband is extra wide and easily adjustable.

The AO Panoram Goggle protects against foreign particles attacking from any direction. It is recommended for chipping, grinding, babbitting, riveting, rail cutting, spike driving, spot welding, hand tool and similar operations. Your nearest AO Safety Products Representative can supply you.

American Optical COMPANY
SAFETY PRODUCTS DIVISION

Southbridge, Massachusetts • Branches in Principal Cities



TRUCK, TRACTOR and FARM IMPLEMENT MANUFACTURERS RELY ON LeBLOND LATHES . . .

For specialized production work, leading truck, tractor, and farm implement manufacturers buy this dependable LeBlond "package": 6AC for roughing and/or finishing crankshafts, 17" Rapid Production for heavy duty, high speed metal turning, the Hydra-Trace for automatic shaft duplicating, and the RT for ultra-precise tool room work. These and many other LeBlond lathes can speed production and reduce costs in your own plant. Why not call in your LeBlond distributor today?

for information

on the LeBlond lathe best suited to your own particular requirements, send today for this helpful bulletin.

THE R. K. LeBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO
LARGEST MANUFACTURER OF A COMPLETE LINE OF LATHES.
SALES OFFICES: New York, Chicago, Philadelphia, Detroit.

LeBLOND

Johansson

BROWN & SHARPE

BS

Johansson Gage Blocks

now available through

Brown & Sharpe Distributors

NEW CATALOG

Send for a copy of the latest catalog on all Johansson Gage Blocks and Accessories . . . now made by Brown & Sharpe. This catalog contains illustrations and detailed information on the use and specifications of these world-famous standards.

These famous precision standards of industry are conveniently accessible through Brown & Sharpe Distributors. Thus, industry is assured a continuing dependable source of supply for JO-BLOCKS and Accessories.

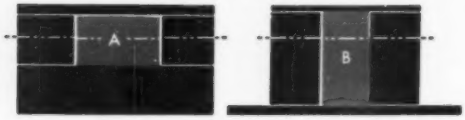
With the purchase of the Johansson Division from Ford Motor Company, Brown & Sharpe acquired all rights to manufacture and distribute Johansson Gage Blocks and Accessories throughout the Western Hemisphere. Since that time, it has obtained the rights to world-wide distribution.

The Brown & Sharpe name is industry's guarantee that the traditional precision of these Johansson products will be maintained without compromise. Brown & Sharpe has symbolized leadership in the development and manufacture of precision measuring devices, machines and tools for more than 100 years. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

We urge buying through the Distributor

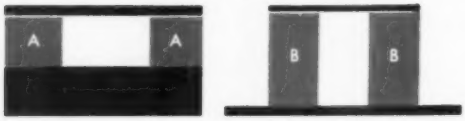
BROWN & SHARPE BS

Choose "A" or "B"
TOOLING AREA
(Work and Tool Axis)



Choose "A" or "B"
BASE SUPPORT

Choose "A" or "B"
UPRIGHT SUPPORTS



Choose "A" or "B"
TOP SUPPORT

HOW GOOD ARE YOU ON MACHINE DESIGN?

The all-round efficient service given by any machine tool, and the opportunity for its improvement and development, usually depend on advantages afforded by its basic design. Before purchasing a machine it will pay to look for the advantages or disadvantages of its basic design.

	MACHINE #1*	MACHINE #2	MACHINE #3	MACHINE #4	MACHINE #5
WORK & TOOL CAPACITY	✓				
WORK & TOOL SUPPORT	✓				
WORK & TOOL MAINTENANCE	✓				

*CONOMATIC

Any good investment has certain qualifications that prove it profitable. The wise investor and smart banker have some sort of measuring stick to analyze every investment they make.

Why not use a measuring stick to chart your purchases of Automatic Bar Machines? If you are already using a chart, perhaps you would like to compare it with the one that we have prepared. Write to us for a copy or ask the Cone representative.

Above are illustrated two types of frame design of Multiple Spindle Automatic Bar Machines. Assuming that the Tooling Area is important — and is as efficient as the frame around it permits — which of the two designs would you choose to meet the following requirements?

WORK & TOOL CAPACITY

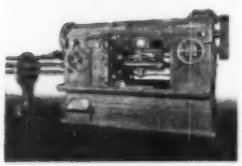
Long, open, roomy Tooling Area and long main end slide for handling longer work and for clearing die heads in threading, etc., to the full collet capacity of the machine; for heavy cross-slide cuts, deep hole drilling, and general all-round work with HSS or Carbide Tools.

WORK & TOOL SUPPORT

Genuine, horizontal, rectangular box-frame, free of overhang; heavy-set, rigid upright members for supporting head-stock and gear box units between heavy, full-length top and base members, for substantial support of all work and tools close to the work and tool axis, and for the maintenance of accurate alignment of work and tools.

WORK & TOOL MAINTENANCE

Heavy, strong, well supported, overhang-free, vibration-free, liberal bearing, convenient, adjustable, work holding units and tool slides, with accessible chip-free cams, with adequate capacity in base member for chip disposal and cutting coolant.



A comparison with ALL Automatics will lead you to

Conomatic

#1A

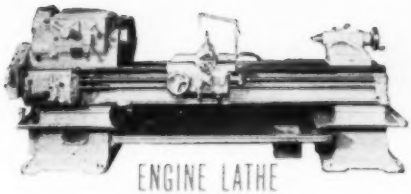
CONE AUTOMATIC MACHINE COMPANY, INC.
WINDSOR, VT., U.S.A.

SPRINGFIELD

LATHES

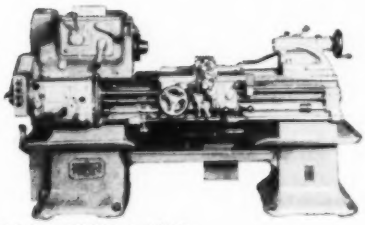
Solve every lathe turning problem

Adaptability to every lathe turning problem and extreme versatility are characteristic of Springfield Lathes. Built with close precision and strict adherence to the highest standards for each component part, they are rugged, reliable, accurate performers on all types of work.



ENGINE LATHE

Anyone of the 16 speeds can be selected quickly and easily to meet the requirements of the tool and the work. Low speeds for heavy cuts or high speeds for carbide cutting tools are instantly available. The Springfield 3-lever speed shifting system reduces the amount of shifting required in the normal sequence of operations.



TOOL ROOM LATHE

Sixty quick change threads and feeds give an exceptionally broad setting for many kinds of work. Threads such as 11½ and 27 pitch which usually require transposition gears are included in these ranges and the standard feeds and threads can be varied greatly.

Easy to set up and operate, these modern lathes are noted for their wide application and their accurate, sustained performance on all lathe turning work. Ask about their adaptability to your own turning problem. Springfield Lathes can solve them—and on a high production schedule.

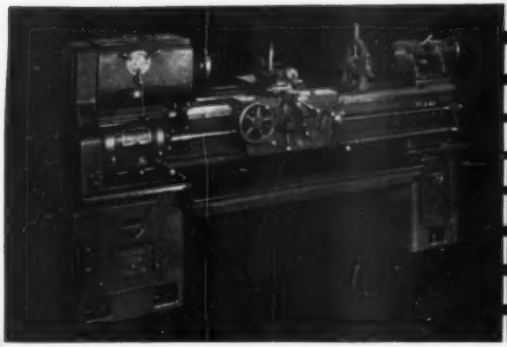
THE SPRINGFIELD MACHINE TOOL COMPANY

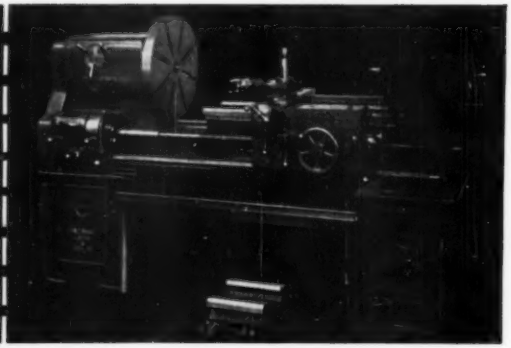
SPRINGFIELD, OHIO, U. S. A.

GENERAL DISTRIBUTORS: BRYANT MACHINERY & ENGINEERING COMPANY, 400 WEST MADISON ST., CHICAGO 6

Exclusive Representatives in All Principal Cities

GET MORE... PAY LESS

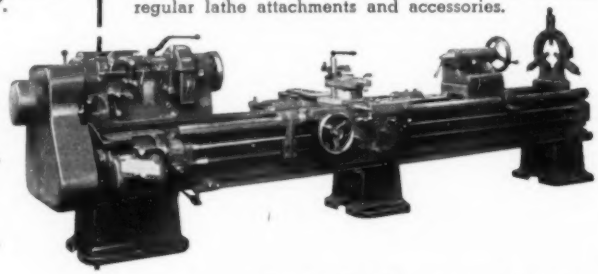


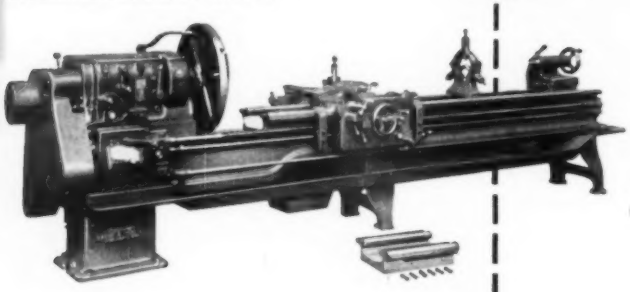


Lightweight Champ: The new Tray-Top line of light duty geared head engine lathes (10", 12½", 15", and 18" swing sizes) offers many "high price" lathe features at truly low cost: 12 spindle speeds, selected by color-coded dial; 48 thread and feed changes; exceptionally large spindles; anti-friction bearings; double-walled apron; totally enclosed quick change gear box; many others. Distance between centers from 18" to 60".

All This – And Gap, Too: 15" and 18" Tray-Tops furnished with gap, give you 22" and 25" swings over gap. Carriage has short wings on headstock end for maximum approach of tool; wings on tailstock are extended for maximum rigidity and adequate bearing surface on bed. Like regular Tray-Top, distance between centers from 18" to 60", in increments of 6". All furnished with regular lathe attachments and accessories.

Middleweight Champ: In the medium duty class, the Standard line (14", 16", 18" 20", 22", and 24" nominal swings) assures you real all-around utility with exceptionally low initial investment; quickly pays for itself by efficient handling of practically all your turning, boring, and threading operations. 12 spindle speeds; 32 thread and feed changes; distance between centers from 30" to 240".





Gaps In All 6 Sizes – Increase Capacity: With swings over gap from 24½" to 38½", Standard Fixed Gap Bed Cintilathes give you oversize work capacity where cost of heavy lathe is not justified. Versatility and economy are balanced to your requirements.

WRITE FOR BULLETINS: *T-100 on Tray-Tops; T-101 on Tray-Tops with Gap; S-100 on Standards; S-101 on Standards with Gap.*

the best buy in its class

cintilathe

CINCINNATI LATHE & TOOL CO., CINCINNATI 9, OHIO

THIS WIDE RANGE OF PUMPS MAKES SELECTION EASIER

COOLANT PUMPS
Centrifugal
Geared

LUBRICATING PUMPS
Geared
Vane

HYDRAULIC PUMPS
Geared

MISC. MACHINE PUMPS
Centrifugal
Geared
Vane

DIRECT DRIVE OR MOTOR DRIVEN

The wide variety of types and sizes available in Brown & Sharpe Pumps simplifies your selection of the right pump for the job.

Every pump in this line has distinctive features to assure economical, dependable long-life service. All have the same familiar standards of high quality that characterize Brown & Sharpe machine and tool equipment.

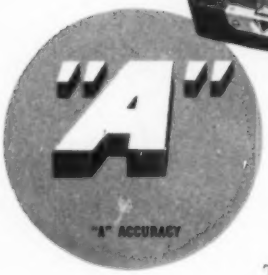
Make your selection with the help of our latest pump catalog. It includes illustrations, complete descriptions, installation dimensions and charts showing performance characteristics. Brown & Sharpe Mfg. Co., Providence 1, R. I., U.S.A.

We urge buying through the Distributor

BROWN & SHARPE PUMPS

TAFT-PEIRCE

GAGE BLOCKS



rate "A" in accuracy and convenience

Taft-Peirce Gage Blocks give you the ultimate in precision and long life. Made of the finest alloy steel; hardened and seasoned for wear and permanence; ground and lapped with high precision to a super-smooth and flat surface . . . these characteristics are your guarantee of longer wear-life.

For your extra convenience, each block has its size plainly marked on the edge . . . a real time saver in selecting the right block every time. The compact mahogany case is so built that each block tilts into selector position at finger-tip pressure.

Set No. 82-A

Includes 81 standard sizes plus an extra block of .10005" which is extremely useful for checking in half-tenth combinations where tolerances are close. Price complete $385.

Set No. 35-A

A smaller set of 35 blocks — yet adequate for the most commonly used combinations. Price complete $200.

To add extra life to your Gage Blocks, two Tungsten Carbide Wear Blocks are available. These can be wrung to either side or both sides of a combination, to take the wear and tear of working contact. Both .050" and .100" Wear Blocks are priced at $20.00 each. Set of two in Mahogany case $40.

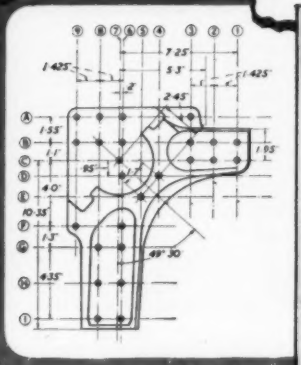
For additional information write:

THE TAFT-PEIRCE MANUFACTURING COMPANY

WOONSOCKET 1 **RHODE ISLAND**

BULLARD SPACER *Goes Abroad*

The de Havilland Aircraft Co., Ltd., are getting good results with a Bullard Man-Au-Trol spacer unit which they are now using in conjunction with an Asquith O.D.I. radial drilling machine in their Hatfield works. By eliminating jigging or marking out in the drilling of a large range of components produced in comparatively small batches, the spacer has cut costs and speeded production. Fig. 1 shows the Asquith radial drill equipped with the spacer unit in the de Havilland factory. It is set up on a comparatively small job for a table of this size, but its versatility may be claimed as an advantage of the device, for it will deal equally well with any work within its capacity. Peacetime production of aircraft obviously calls for a good deal of comparatively small batch work. At de Havilland's they have tooled up extensively for production of their Dove aircraft of which they have sold a large number. But others of their machines are going through in small lots, prototypes and "pilot" production. For this class of work involving machining a few off of widely different components, the company are already satisfied that the Man-Au-Trol spacer unit offers interesting possibilities. It has the advantage, too, that it will work to quite close limits — the makers claim an accuracy of 0.001 in. in spacing.



Co-ordinates of the various holes are shown superimposed on this drawing of the component. Each hole is identified by one letter and one number for setting on the handwheels.

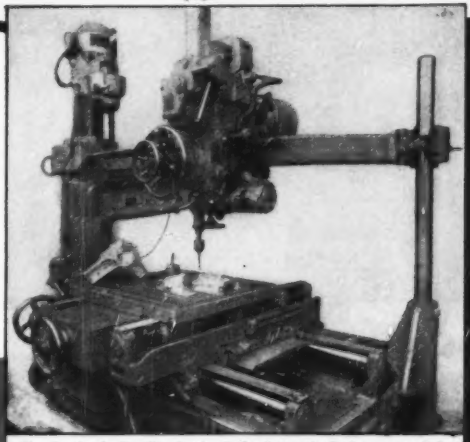


Fig. 1.—At de Havilland's the Bullard Man-Au-Trol spacer unit is mounted on an Asquith O.D.I. radial drill, the arm of the machine being secured by a clamp to an outer supporting column mounted on the base.

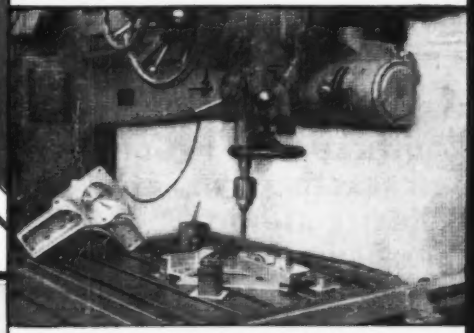


Fig. 2.—Close-up of the table, showing a typical job clamped to the surface ready for drilling. A completed component is also shown on the left of the photograph.

Performance and Efficiency prove the Bullard Spacer to be a Profitable Investment.

THE BULLARD COMPANY
BRIDGEPORT 2, CONNECTICUT

GANG UP *your small work on the*

GRAY OPENSIDE PLANER CUB

Secure the advantages of...

- **MULTIPLE HEAD PRODUCTIVITY**
- **INCREASED ACCURACY**
- **GREATER RIGIDITY**
- **SPEEDS UP TO 300 FT. PER MIN.**

Built in 24, 30, and 36" sizes. The Gray Openside Planer Cub has the speed and rigidity demanded by modern carbide planing.

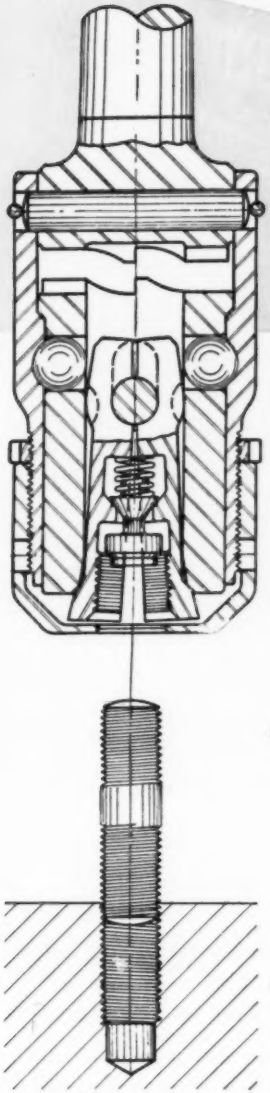
The G.A. **GRAY** *Company*

planers • milling planers
planer type milling machines
horizontal boring machines

CINCINNATI 7, OHIO, U. S. A.
SOLD IN CANADA BY UPTON, BRADEEN AND JAMES, LTD. • SOLD IN LATIN AMERICA BY MACHINE AFFILIATES

SPEED UP
your stud setting

Faster, more economically in one continuous operation



Tool in position over the stud ready to start the drive.

MODERN SELF-OPENING STUD SETTER

This simple tool does your stud setting job in a single, quick, continuous operation. When the stud is driven to the desired depth, contact between the stop collar and the work releases the clutch, then lifting the tool off the stud automatically disengages the jaws. No reversing. No backing off the stud.

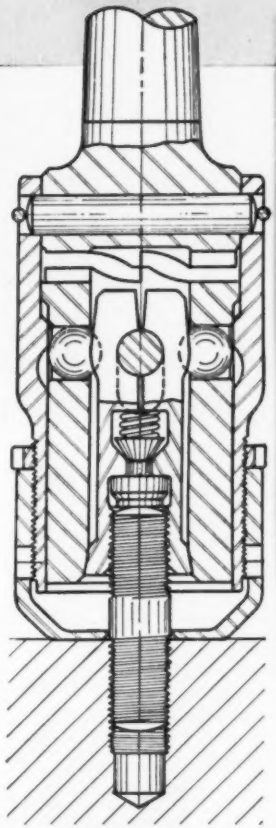
If you have studs to set in quantity, it provides a means to greater production volume at lower operating cost.

The action of the Modern Stud Setter is positive and entirely automatic. It can be operated in any position with either air or electrically operated portable tools. It is equally effective for use in drill presses where it is possible to drill and tap the holes and set the studs in successive operations.

Made in two sizes: ½" and ⅞" capacity.

Many automobile, truck, tractor and diesel engine manufacturers and others having studs to set in quantity rely exclusively on Modern Stud Setters.

Let Modern Engineers help with your stud setting problems. Full information will be furnished promptly upon request.



Drive completed. Jaws open automatically releasing the tool.

MODERN TOOL WORKS

DIVISION OF

CONSOLIDATED MACHINE TOOL CORPORATION

ROCHESTER 10, NEW YORK

Remington Rand

MACHINES FOR MANAGEMENT

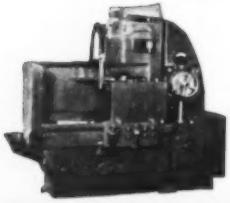
WATCHMAKER PRECISION characterizes every phase of Remington Rand's activities . . . PRECISION in advanced engineering . . . PRECISION in manufacturing hundreds of thousands of intricate assemblies to serve the world's business.

they PUT IT ON THE BLANCHARD

THE JOB: GRINDING BOTH SIDES OF PRINT WHEELS — TO LIMITS ±.00025". Material is No. 1010 Steel — 2.660" diameter x .100" final thickness. Stock removal per side is .009" to .013".

THE METHOD: *Remington Rand Engineers chose a No. 18 Blanchard Surface Grinder* . . . 113 print wheels are simply and quickly placed on the 36" magnetic chuck. . . .

THE RESULT: *which of course governed the choice of the most suitable machine* . . . two chuckloads or 226 accurately sized pieces (452 surfaces) per hour. Difficult grinding jobs are made simple with Blanchard Grinders.



Whether your flat surface grinding job is simple or seemingly difficult, Blanchard Engineers will gladly assist you in arriving at the most profitable solution. Avail yourself of this free, non-obligatory service.

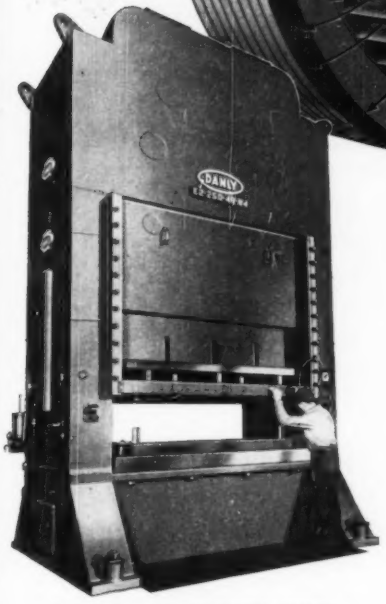
BLANCHARD

The BLANCHARD MACHINE COMPANY

64 STATE STREET, CAMBRIDGE 39, MASS., U. S. A.

A Big Reason Why

DOWN-TIME *is* REDUCED *with* DANLY PRESSES



New Exclusive Clutch Design Increases Production Efficiency

The complete line of Danly Mechanical Presses are engineered to reduce down-time and insure longer, uninterrupted operations. A new and entirely different type of friction clutch is used which eliminates the most common cause of clutch failures—excessive heat generation. This cool operation contributes to the long life of the friction disc and all non-metallic elements of the clutch.

Low Starting Torque Reduces Heat and Wear

Most of the components in the new Danly Press Clutch rotate continuously with the flywheel. With fewer elements subject to acceleration, starting torque and heat are substantially reduced. These advantages, plus the provision for rapid heat dissipation by forced air circulation, assure cool operation even under severe operating conditions. Cool operation greatly increases friction disc life resulting in less maintenance expense and less press down-time.

QUICK FACTS ABOUT DANLY PRESSES

Capacities: Sizes from 50 to 3,000 tons.

Types: Heavy-Duty Autofeed, Standard Autofeed, 1, 2, and 4-point Straight-Side, Double-Action and Gap Frame types.

Outstanding Features: Built-in automatic lubrication, extra heavy steel frames, extra long gibbing, built-in wiring and pre-tested electrical controls, and special engineering to suit your needs.

Write For *Free* Literature

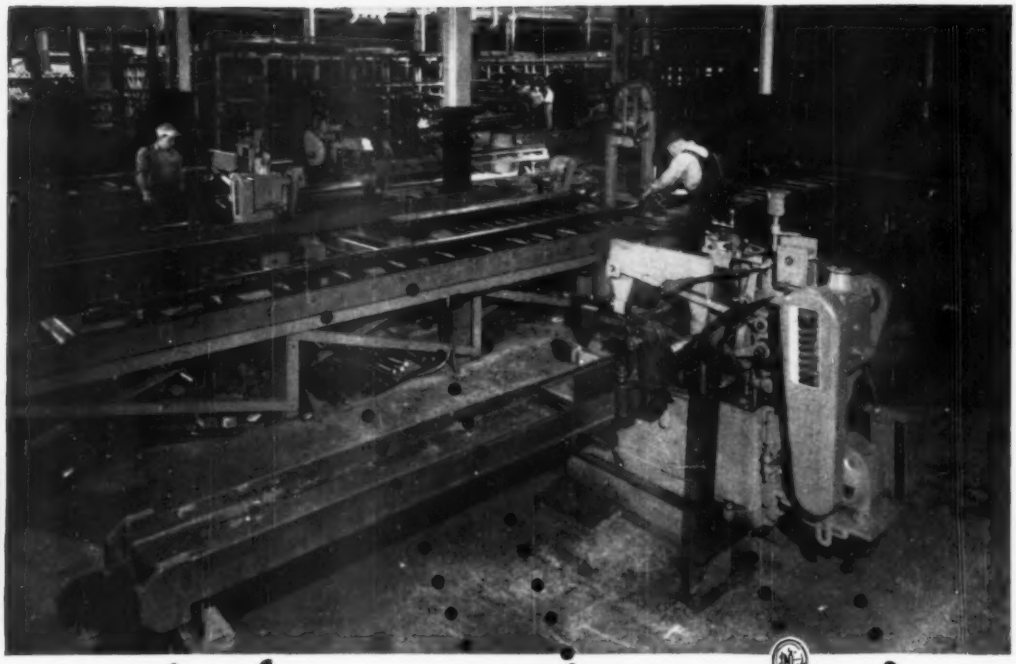
Write for more facts today. Find out how the modern outstanding features of Danly Presses will help you increase output and lower your stamping costs.

DANLY MACHINE SPECIALTIES, INC.
2100 SOUTH 52nd AVENUE CHICAGO 50, ILLINOIS

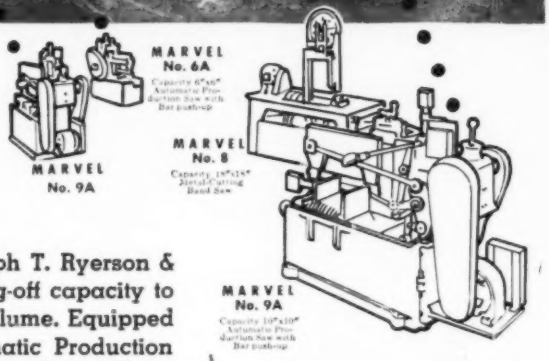
DANLY

OVER 25 YEARS OF DEPENDABLE SERVICE TO THE STAMPING INDUSTRY

MECHANICAL PRESSES AND PRESS EQUIPMENT



capacity for . . . *"Cut to length"* SERVICE!



This recently enlarged, giant, Joseph T. Ryerson & Son, Inc., steel warehouse has cutting-off capacity to give fast service on any conceivable volume. Equipped with one Series 6A MARVEL Automatic Production Hack Saw, four Series 9 MARVEL High Speed Hack Saws and a No. 8 MARVEL Band Saw, the warehouse can deliver single or literally thousands of cut-to-length pieces on short notice—pieces cut to order from bars, tubes or shapes.

MARVEL-cut pieces from this warehouse will be accurately and squarely cut. It always pays to buy steel from MARVEL equipped warehouses.

Above: One cutting-off department of the Joseph T. Ryerson & Son, Inc., steel warehouse at Philadelphia.

Metal Cutting
MARVEL SAWS
Better Machines-Better Blades

See our CATALOG in SWEET'S FILE

ARMSTRONG-BLUM MFG. COMPANY

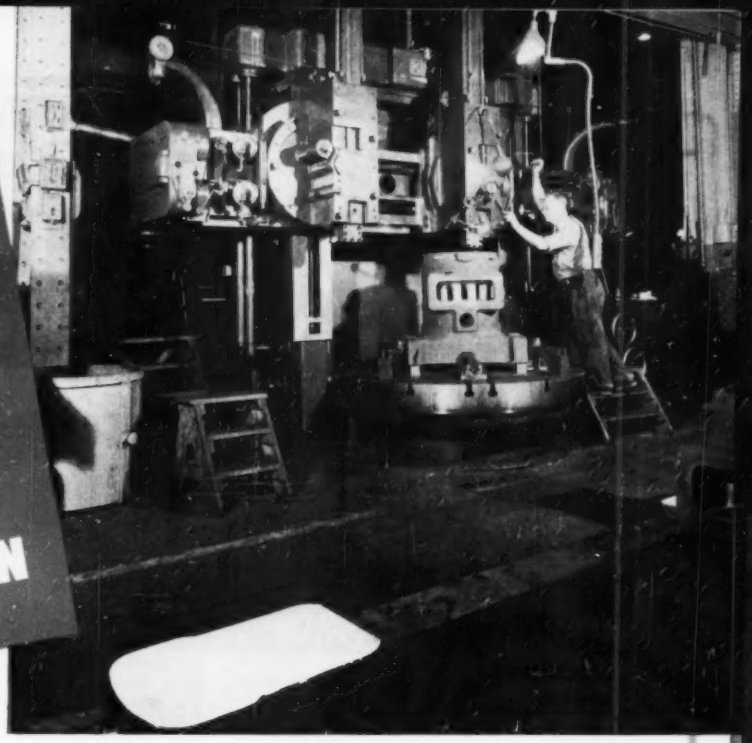
5700 W. BLOOMINGDALE AVE., CHICAGO 39, ILLINOIS

New Series

KING

at

COOPER-BESSEMER CORPORATION



CUTS PREVIOUS MACHINING TIME ON THIS JOB BY

4 Hours!

The 72" KING Vertical Boring & Turning Machine shown above is machining the main bore of a GMV gas engine cylinder at The Cooper-Bessemer Corporation, Mount Vernon, Ohio. The hole is 14" in diameter by 33" long, holding a tolerance of + .000" —.003", and must be straight within .001". Cooper-Bessemer officials report "We have been able to reduce our floor-to-floor time 4 hours over the old method of machining."

Cost reductions like this are typical. New-Series KING mills have the extra weight, rigidity, and power essential for maximum results from use of modern cutting tools . . . for faster, consistently accurate, more profitable work. A wider range of feeds and speeds plus simplicity of control assures high adaptability for all types of work—light or heavy, large or small.

Call in a KING Engineer. He will be glad to give you all the facts . . . to show you exactly how the versatile, powerful New-Series KING can save time and maintain high precision accuracy on your boring, turning, and facing operations.

New-Series KING Vertical Boring & Turning Machines are made in 10 sizes: Single Column—30", 36", and 42"; Double Column—52", 62", 72", 84", 100", 120", and 144". All sizes are available in a variety of head combinations, with or without side head.

American Steel Foundries

KING MACHINE TOOL DIVISION

CINCINNATI 29, OHIO

Builders of King Vertical Boring & Turning Machines and Sebastian Lathes

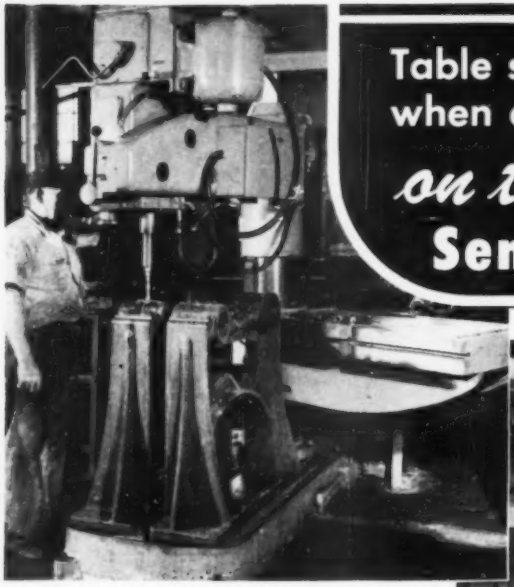


Table swings out of the way when a big job comes along *on the* FOSDICK Sensitive RADIAL

Photos courtesy Edward Renneberg Sons plant, Baltimore, Md.

● This installation definitely illustrates the advantage of the swinging action of the adjustable table on the Fosdick Sensitive Radial. Table and arm both swing in an arc of 360 .

Also note that two castings are mounted on the conventional Radial Drill base in such a position that holes can easily be drilled in all four bearing caps by merely moving arm and head to desired position.

This also demonstrates the advantage of a high speed sensitive drill built along the lines of a radial drill and reveals new cost saving methods of drilling small holes in a wide variety of work.

If you are interested in a sturdy, sensitive drill that combines all the advantages of radial flexibility you should investigate the new Fosdick Sensitive Radial.

For full particulars write for the Fosdick Sensitive Radial Bulletin S R A.

FOSDICK MACHINE TOOL *Company*
CINCINNATI 23, OHIO

HIGH HORSE!

Complaints on his gravity conveyors had this manufacturer over a barrel. Sections are too heavy!... Make 'em more portable! He wanted to switch from heavy metal to magnesium, but his factory manager got on his high horse ... said the shop wasn't set up to handle it. To settle the argument, they contacted Aluminum Company of America, light metal headquarters. They learned that common-sense shop practices make handling magnesium no problem.* Fellow manufacturers, they discovered, are using over a million pounds of this modern metal every month. They got useful technical facts, plus books on designing and fabricating magnesium. Now that they've converted to strong, easy-to-machine American Magnesium Extrusions and Tubing, their new lightweight conveyor is showing its dust to competition.

*No change in insurance rates.

These two, free books on magnesium and our broad technical experience can help your products, too. Write Aluminum Company of America, sales agent for American Magnesium Products, 2107 Gulf Building, Pittsburgh 19, Pennsylvania.

MAGNESIUM MAZLO® PRODUCTS

AMERICAN MAGNESIUM CORPORATION

SUBSIDIARY OF ALUMINUM COMPANY OF AMERICA

ARMSTRONG

TOOL HOLDERS...

for every operation!

There are ARMSTRONG TOOL HOLDERS in sizes and types for every operation on lathes, planers, slotters and shapers —for the heaviest cuts; for the most delicate cuts.

With Standard shaped cutters, bits and blades of ARMSTRONG HIGH SPEED, ARMALOY (Cast Alloy) and ARMIDE (Carbide-Tipped) they provide a system of tooling that assures maximum production per machine hour, lower tool costs, and higher machining profits.

These permanent multi-purpose tools can be picked up as needed from your industrial distributor. Use them wherever possible to increase number of pieces per hour, to lower cost per pieces.

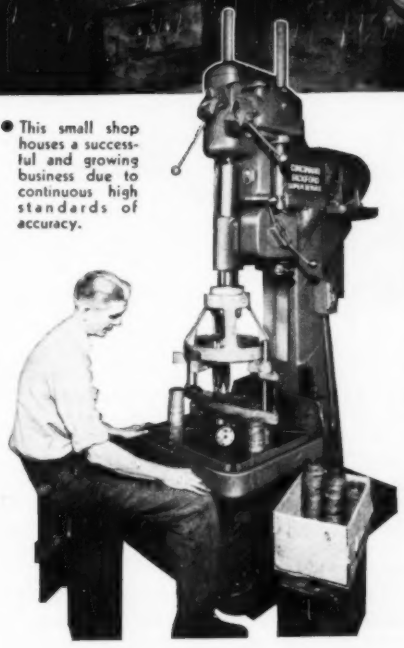
Write for Our New S-48 Catalog.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

5215 W. Armstrong Ave. Chicago 30, Ill.

4-Man Shop with a FUTURE



● This small shop houses a successful and growing business due to continuous high standards of accuracy.

Quality equipment pays the small operator as well as the large.

The Schoening Machine Service, 3284 Dunn Street, Cincinnati, Ohio—business, production machining—small in size—big in accomplishment—testifies to the value of fine tools.

The Cincinnati Bickford Super Service Upright Drill, illustrated, is drilling five $\frac{11}{32}$" holes and four $\frac{13}{32}$" holes to a plus or minus .005" tolerance in a steel cover $\frac{5}{16}$" thick—a production job.

Mr. Schoening tells us he has held accuracy to a plus or minus .0002" on production reaming jobs.

Write for Bulletin No. U-25.

THE CINCINNATI BICKFORD TOOL CO.
RADIAL AND UPRIGHT DRILLING MACHINES
SUPER SERVICE

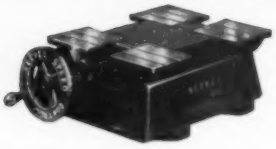
Radials 7½" dia. col., 2½" arm, to 96" dia. col., 12' arm.
General purpose Uprights, 21" to 28" sizes.
Production Uprights, 21" to 28".
Jig Borers, Portable Horizontals, Spacing Table Machines.

Equal Efficiency of Every Unit Makes the Balanced Machine

THE CINCINNATI BICKFORD TOOL CO. Cincinnati 9, Ohio U.S.A.

Reeves Vari-Speed Motor Pulley

converts any standard constant speed motor to a low-cost stepless variable speed drive . . .

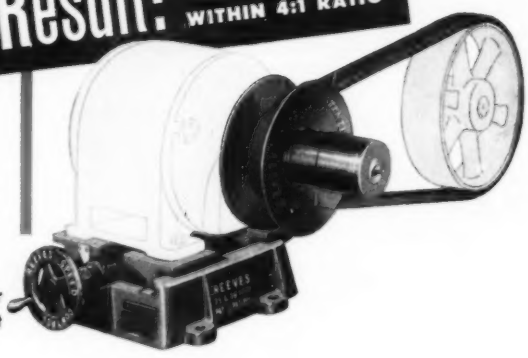


1. REEVES Motor Base provides sliding platform for motor. Handwheel or push-button control increases transmitted speed by moving motor toward driven machine, decreases speed by reversing the operation.

2. Disc Assembly connects directly to motor shaft. Assembly consists of two facing cone-shaped discs—one sliding laterally—and compression spring for mounting on motor extension shaft.

3. Special V-Belt hooks up unit with driven machine. Belt fits between discs and over pulley on power input shaft of driven machine. Belt is adjusted to minimum center.

Result: INFINITELY VARIABLE SPEED WITHIN 4:1 RATIO



Unit instantly delivers any desired speed over entire range and maintains that speed without fluctuating even a fraction of an rpm.

The REEVES Vari-Speed Motor Pulley is the easiest, lowest-cost method of converting a machine with fixed speeds into a highly versatile unit of infinitely variable speed adjustability. Thus equipped, it can handle a wider range of work, better, faster and more economically, because machine speed can be changed instantly and accurately—without shutdowns—to meet the needs of every operation and every operator, *under every changing condition.*

This REEVES unit forms the actual driving element between motor and driven shaft . . . eliminates all auxiliary equipment such as chain drives, gears, belts, etc., . . . requires virtually no more space for installation than any standard belt or chain drive. It is built in eleven sizes, transmitting from ⅛ to 15 hp, over speed ratios from 2¼:1 to 4:1, inclusive.

The complete line of REEVES Speed Control equipment also includes two other basic units, the Variable Speed Transmission and the Motodrive, which are offered in the widest selection of designs, sizes, capacities and speed ratios—with handwheel, push-button or entirely automatic controls.

REEVES units have proved their ability to speed production cut cost and increase profit in more than 260,000 widely diversified industrial applications . . . are listed as standard equipment on over 2,100 different makes of modern machines.

An experienced REEVES Speed Control specialist will be glad to work with you in selecting the units best suited to your needs. Write today, arranging an interview, and ask for the comprehensive 114-page catalog A7-450A.

REEVES PULLEY COMPANY • COLUMBUS, INDIANA

Recognized Leader in the Specialized Field of Speed Control Engineering

ACCURATE • VARIABLE

Reeves Speed Control

GIVES THE RIGHT SPEED FOR EVERY JOB!

SPOT NEWS OF METALWORKING

Die cast aluminum parts are being studied extensively by a prominent automobile manufacturer as possible replacement for sheet metal and other parts. Weight saving is chief aim, the saving being used to "beef up" the car in other places. In connection with the program, the manufacturer's men are visiting plants employing die-casting machines to determine advantages and disadvantages of die cast parts and their cost.

Compounding and extruding of plastics now can be done on a single machine reported to have been developed by Welding Engineers, Inc., Norristown, Pa.

Not more than five-days' inventory of raw materials prior to the start of the first manufacturing operation is the immediate objective of one of the nation's largest metalworking companies. Where it is necessary to do so, materials orders are being rescheduled or cancelled to attain this goal.

Production of metal spraying equipment and materials will start in England soon, expecting to reach an annual value of $400,000 in three years, ending Britain's import needs. ECA has awarded a $45,000 industrial guarantee to Metallizing Engineering Co., Inc., Long Island City, N.Y., to start production through its British associate, Metallizing Equipment Co., Ltd., at Chobham in southern England. Half of the production is slated for export.

Coal operators aren't too happy about consumption. Railways have reduced their needs about 15% by use of diesel locomotives. At the same time steam electric power plants have increased their demand for coal about the same amount, but they buy coal by the Btu while railways buy by the ton.

The farm equipment union faces possible loss of its CIO charter this fall for refusing to merge with the automobile workers.

Great Britain shipped machinery worth 12 million pounds sterling to Brazil in the first three months of 1949, nearly twice the value of such sales in the corresponding quarters of 1947 and 1948. The machinery included boilers, cranes, sugar refining machinery, textile machinery and power equipment.

The second Decontrol Act of 1947 will die June 30 unless Congress acts quickly. Under the act was authority for Office of Defense Transportation, import controls, and export priorities.

Many fourth-round wage negotiations in metalworking plants are being put off until after settlements are reached by industry leaders.

The Ordnance School at Aberdeen plans to spend $300,000 for machinery to use in training machinists for the Army.

More business for U.S. shipyards will come if long-range shipping legislation now before Congress is passed. U.S. maritime interests are confident it will be, because the program won't cost any money right away, most controversial issues were ironed out before it was presented, and Rep. Bland's House Merchant Marine and Fisheries Committee is solidly behind it. The bill extends many advantages to tramp operators formally available only to steamship companies operating over so-called essential trade routes.

Gaging Metalworking

As the metalworking industries go into the summer season, they are operating on the whole at more than double the 1939 rate, based on manhours worked.

► Settlement of the 25-day Ford strike will aid the AMERICAN MACHINIST Index of Metalworking Production in June. That strike, and the Bendix strike, helped pull the index down in May (though no May figures are yet at hand. The April figure was 208).

► With the traditional summer slowdown again exerting an influence, as it did in prewar days, and with widespread plant closings of one week or two weeks for vacations in July, the index cannot be expected to rise in the near future.

Companies Are Inventory-Conscious

The decline in metalworking output the past few months can be traced in considerable measure to the fact that manufacturers are extremely inventory-conscious. The bigger companies, in many cases, are carrying on active campaigns to cut down sharply their stocks of raw materials. Such campaigns are carried out by organized groups within a company to coordinate and spearhead the inventory reduction program, which often includes disposal of surplus and obsolete material.

► Vendors are being asked to adhere rigidly to shipping schedules of customers and are changing their policies to conform to these wishes.

Machine Tool Sales Quiet

Machine tool orders are believed to have shown no improvement in May as against April. The final figures will turn on what happened in export. Builders are not hopeful of much if any improvement in bookings during the summer months. They feel, however, that an upsurge in new orders will occur beginning in September.

► The improvement may be speeded if ECA buying for the fiscal year 1950 should get started earlier than anticipated and if defense purchases should materialize soon. As the matter now stands, tooling for the Air Force program probably will require some $75 million of new machine tools. This amount will be over and above any surplus machines taken out of government reserves.

New Orders Ahead of Shipments

In the first four months of this year, new orders for machine tools are understood to have exceeded actual production by $12 million. At this writing it is not unreasonable to predict that 1949 may wind up with factory shipments having been less than bookings. If so, this will reverse a trend which has persisted since 1943.

► Many buyers of machine tools domestically are sticking to a watchful-waiting policy at the moment. Inquiries are plentiful and are coming from all quarters.

Tool and Die Inquiries Pour In

The one bright spot in the tool and die industry is the flood of inquiries and requests for quotations which continues to pour in. April, otherwise, continued the downward trend in new orders booked and in sales invoiced. Though no figures are available for May, it is believed that the month was no better than April, and possibly not as good.

► Hours worked by contract tool and die shops during April were off 13% from the same period of last year. Business fell around 15% from the March level. For the first four months of 1949, sales invoiced (actual work done) were 89% of the total in same months a year ago.

► Shops in the Middle West, with the possible exception of Dayton, O., are facing the same unfavorable situation as those in other regions, after having done much better than the average for some time. The tool and die industry's backlog is about six-weeks' work.

► Despite the unfavorable turn of events, shop owners are reasonably optimistic, feeling that an upswing will begin not later than midsummer. Inquiries are originating in almost all segments of metalworking, but the volume of requests from the automotive industry is below par.

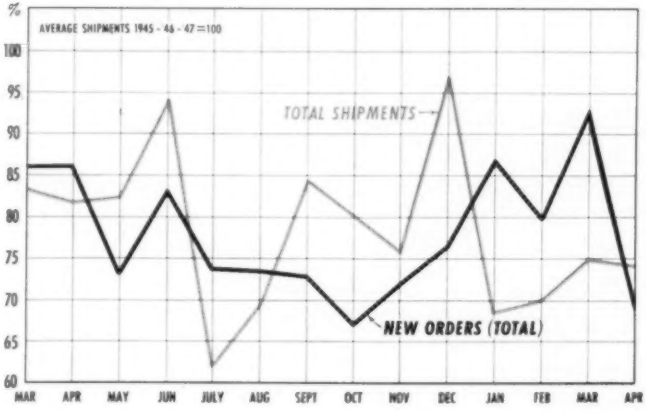
Steel Mills Soliciting Orders

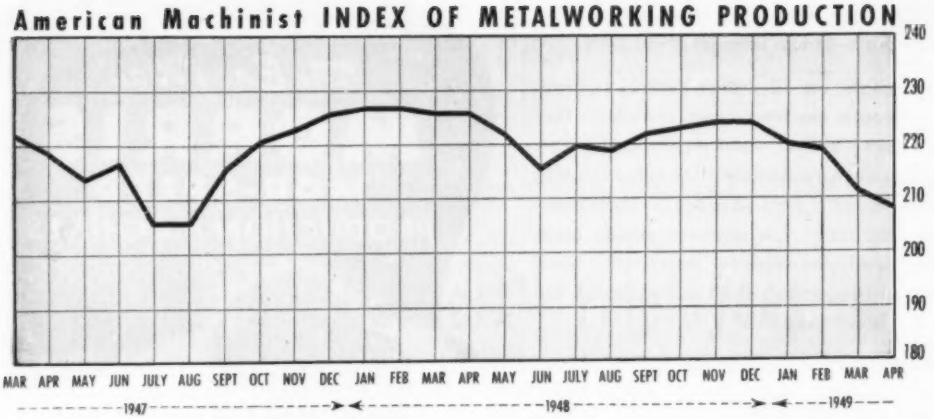
Steel sheet and strip, the tightest items in steel, continue to soften.

APRIL MACHINE TOOL ORDERS DROP, SLIGHT CHANGE IN SHIPMENTS

Date	New Orders (Total)	Foreign Orders (Included in Total)	Shipments (Total)
(1948)			
Apr.	86.3	14.1	92.0
May	73.5	11.4	82.6
June	83.4	11.9	94.4
July	74.0	13.3	62.4
Aug.	73.7	13.6	69.8
Sept.	73.1	11.6	84.7
Oct.	67.4	14.0	80.4
Nov.	72.2	18.1	76.2
Dec.	76.7	16.2	96.9
(1949)			
Jan.	87.0	21.9	68.8
Feb.	80.9	26.5	70.3
Mar.	93.5	22.3	75.8
Apr.	p69.8	p22.8	p74.4

p—Preliminary figures. Data: NMBTA Index





INDEX		COMPONENTS				
		MACHINERY	ELECTRICAL MFG.	AUTOS, TRUCKS	TRANS-PORTATION EQUIP.	OTHER METAL-WORKING
Apr. 1949 (preliminary)	208	222	203	219	294	142
Mar. 1949 (revised)	211	232	211	216	301	144
Apr. 1948	226	249	237	228	293	183

AMERICAN MACHINIST'S INDEX OF METALWORKING is based on manhours worked in five segments, which are "weighted" as follows: Machinery, 32.5—Auto & Trucks, 22.6—Electrical Manufacturing, 15.4—Transportation Equipment, 12.4—All Other Metalworking, 17.1. Index figures are a percentage of 1939, which equals 100.

Mills are soliciting orders in a keenly competitive spirit, in sharp contrast to the situation only a few months ago. Instead of having to place orders far ahead of mill rollings, customers now can get delivery in a very short time. Sheet and strip mills have revised their extras downward. Warehouses are reported to have shaded their prices.

► There is no expectation of stopping the downward movement of orders in steel products other than sheet and strip during the next month. Mills from which users have been absorbing premium freight are now out getting business. Delivery dates differ widely among the mills, but in all instances are closer than the time schedule which prevailed a month ago. Demand for alloy steel is lagging.

Copper Buying Sags

Copper buying has fallen off greatly. The recent drop in prices, totaling 5½¢ per lb., has made users cautious. Some higher-cost producers have closed their mines.

► A large consumer of copper has ordered less than one-half its estimated needs during the second quarter. The same was true of many other companies which chose to live off their inventories. Sales of finished brass and copper products have declined substantially. Brass and copper fabricating mills are operating on short time.

Normal Aluminum Shipments

Aluminum situation does not differ much from that in other materials. Buyers are less keen about placing orders and production has had to be cut back in most cases. The result is that shipments have returned to a normal basis. Availability of more power has increased the output of aluminum pig.

Lead prices are far below the March level, down almost 8¢ a lb. Scrap lead is moving very slowly despite low prices. It is possible that government stockpile purchases may stabilize the market.

No word has come yet about lifting of controls on tin as of June 30. Current supplies are reported to be ample to meet present demands.

High Applicance Inventories

A depressed condition persists in manufacture of household appliances with almost all companies operating on greatly reduced schedules. Inventories are high and customers are waiting for lower prices. This combination is not promising for a pick-up in production schedules through the summer.

As a counterbalance, however, business in heavier goods continues at a good clip. Makers of construction machinery are well pleased with the volume. Tractor and farm implement builders still have comfortable backlogs, but production is running ahead of new orders and a steady decline in the volume of backed-up business is looked for.

Construction Better Than 1948

Construction is proving a strong point in the national economy. Contracts awarded for heavy engineering construction are averaging about 18% ahead of 1948. Private construction work, as a surprise, is some 20% better than last year, while public works are up only 15%. The reverse had been anticipated. By classes of work, the biggest gains are in public buildings, commercial building and bridges.

Homebuilding is more active than expected. Because the extreme housing shortage is fading fast, builders forecast a drop of 10% in residential construction. But the number of houses started this year, though below last year, is well ahead of 1947.

Cost of Living Holds

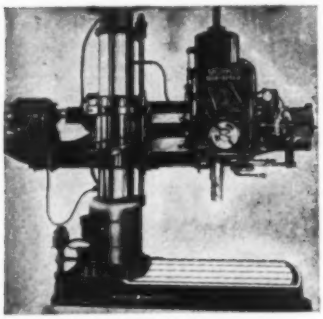
While industry watches for a key settlement in the fourth round, the cost of living is about where it was in April a year ago. It went up two-tenths of a point in April, but is down more than four points from its high of last September.

● Each Morris high production machine is designed for the job. The result is more completed parts—in less time—at lower costs.

For example, the 10 station Vertical Hydraulic Automatic machine shown completes four operations—drilling—reaming—chamfering—tapping—on an automobile Oil Pump Housing and turns out a finished piece at each index of the machine. The operator merely loads and unloads the work by means of a hand clamp arrangement which operates the ten hand clamp fixtures.

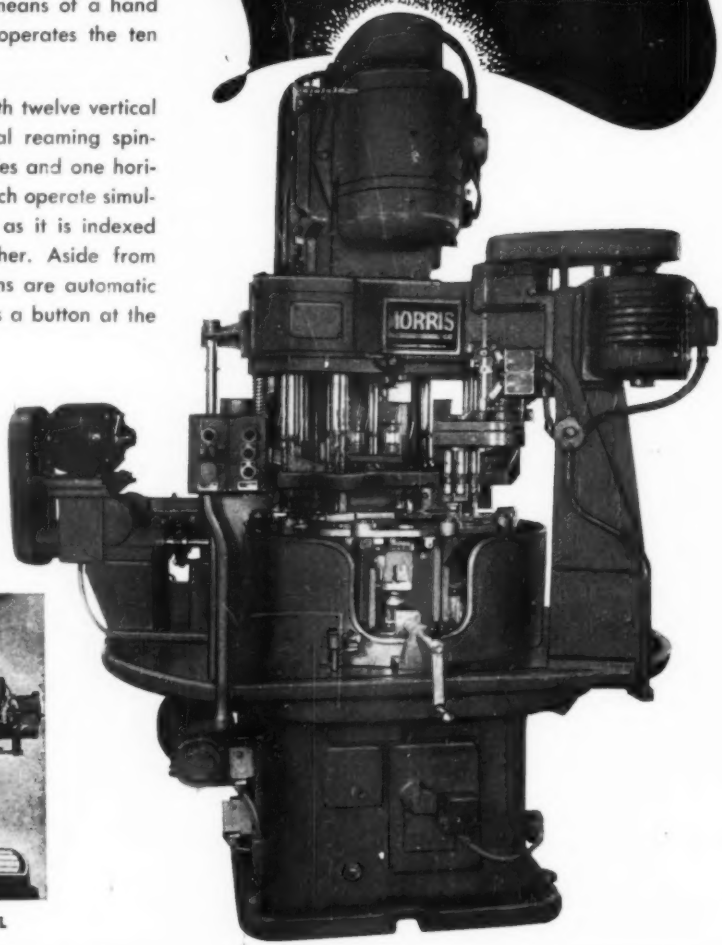
The machine is equipped with twelve vertical drilling spindles, two vertical reaming spindles, four vertical tap spindles and one horizontal drill spindle all of which operate simultaneously on a work piece as it is indexed from one position to another. Aside from hand clamping all operations are automatic and operator merely presses a button at the start of each cycle.

On your work requiring multiple drilling, reaming, tapping and similar operations, on a mass production basis, consult Morris. They have the engineering experience, mechanical "know-how" and facilities to help you meet rigid production demands at low cost.



MORRIS MOR-SPEED RADIAL

MASS PRODUCTION
The Easy Way
MORRIS
MOR-SPEED
PRODUCTION MACHINES



Builders of MOR-SPEED Line

The MORRIS Machine Tool Co.
CINCINNATI 3, OHIO

American Machinist

MAGAZINE OF METALWORKING PRODUCTION * ESTABLISHED 1877

How To "Convert" Employees

This is the story of a company which long had made a precision metal product sold in competition with similar imported products.

But the time came when it could not stand up against foreign competition. It was at a grave price disadvantage.

The management went into a huddle and came up with some startling facts. Using new production methods, including a large degree of mechanization, it could make its products and sell them in competition and still come out with a considerable profit.

It tried to introduce these new methods in one of its main plants. To the management's consternation, the employees refused to accept them.

What is more, it was impossible for the management to hire anybody in that community willing to be broken in to the new methods. Everyone had his own ideas as to how the job should be done. And those ideas had been handed down from fathers and grandfathers, all of whom had been employed making this product.

The management had only one recourse, and it took it. It reluctantly built a brand-new factory in another city. It then hired inexperienced workers, without preconceived ideas, who were trained in the new methods.

This new factory has been operating for some time on a profitable basis. It is well able to meet all competition.

There are still a few operations done in the old plants at a profit. But it is only a matter of time, perhaps a year or two, before the old plants will be shut down for good.

Here then is the case of employees rather than management declining to learn new tricks. These men were, in reality, trying to tell management how it should run its business. The trouble was that the company could not survive by sticking to the old instead of adopting the new.

It would be unfair, however, to let the management of this company escape criticism. It was not all the employees' fault. They had been raised on the techniques of their fathers because the company had used those techniques without much if any change through several generations.

The management was fortunate enough to "get religion" before complete disaster overtook the company. But the "conversion" of its employees was another matter which could not be accomplished overnight.

The point is that the employees should have been converted by a lengthy process of education to accept the new. But there was no time for it. Events moved too rapidly.

To avoid this sort of thing happening, every progressive metalworking company should tell to its employees the story of what modern production methods mean to the company's success and to their own fortunes.

That story should not be merely in generalizations. It should be pinned down closer home. It should be in terms of the company's own products and the employees' own incomes and jobs.

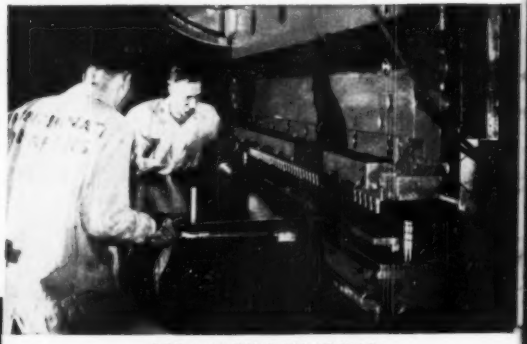
If that were done over a considerable period, the chance would be remote that other companies would get themselves into the unpleasant and tight fix in which this one manufacturer found himself.

Burnham Finney

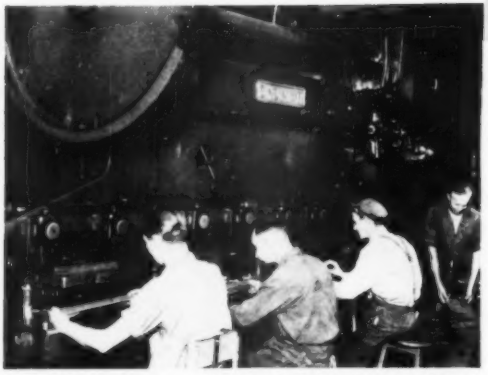
EDITOR

Use a Press Brake...

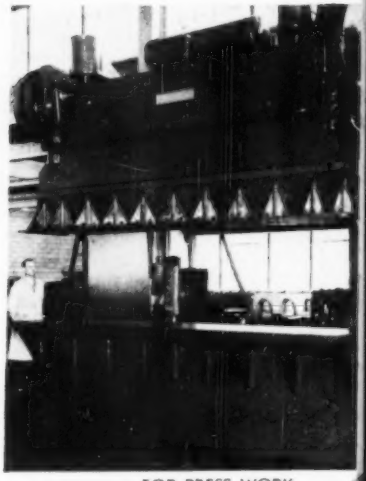
FOR BENDING



FOR MULTIPLE PUNCHING



FOR PROGRESSIVE FORMING, PUNCHING, NOTCHING



FOR PRESS WORK

Many a job is best on a Cincinnati Press Brake. This versatile machine forms, bends, corrugates, punches, notches . . . using simple low-cost dies for jobbing work, or progressive and multiple dies for quantity production.

Its wide utility reduces manufacturing costs . . . its unusual accuracy pays on the assembly line . . . it's a producer of double dividends.

Write for Brake Catalog B-2.

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO U.S.A.

SHAPERS · SHEARS · BRAKES

HOWS AND WHYS OF

INDUCTION SOLDERING

Proper solders, fluxes and joint design, with suitable fixtures, make this method of joining a high-production process

BY FRANK W. CURTIS

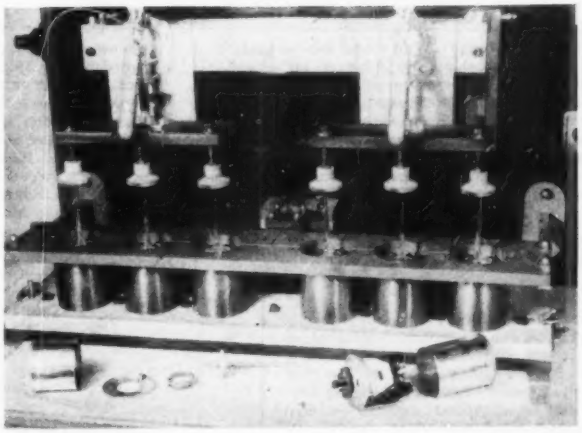
INDUCTION soldering is, as any other soldering with tin-lead alloys, a means of providing a solid bond between metal surfaces. Induction heat speeds joint completion and localizes heat. These two factors avoid heating of adjoining surfaces, such as would tend to soften or anneal work-hardened materials.

Several conditions are vital. They include:

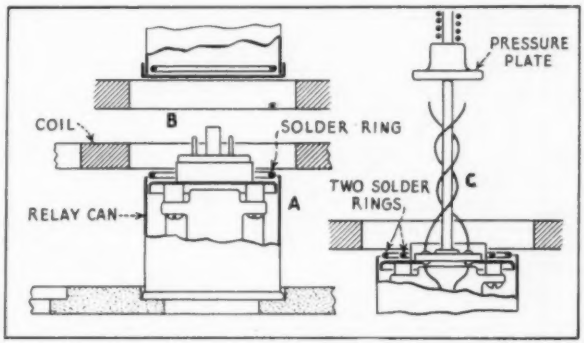
Cleanliness. Nothing is more important than a clean surface. Dirt, grit, grease, rust, paint, oxide or any other film will result in an unsatisfactory joint, or even make soldering impossible. Cleaning may be done with a wire brush, sandpaper, sandblasting or chemical cleaners, depending on shape and size of parts. Parts should be kept clean until they are joined, and preferably should be soldered immediately after cleaning so normal surface re-oxidation cannot take place.

Type of joint. In soldering, it is necessary that surfaces be properly fitted and that they embody sufficient strength to withstand the service expected. Solder does not possess great strength, therefore, strength is dependent on the joint. Strength increases as the solder film decreases. Normally, 0.001- to 0.004-in. thickness of solder will produce strong joints.

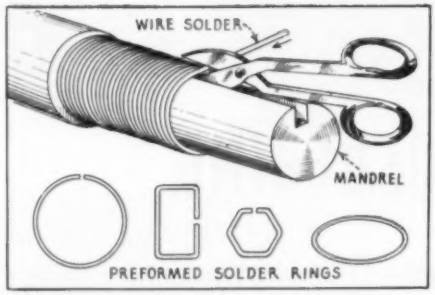
Solder and flux. Soft solders are made in various ratios of tin and lead, in solid, paste and liquid forms. Fluxes usually are paste or liquid,



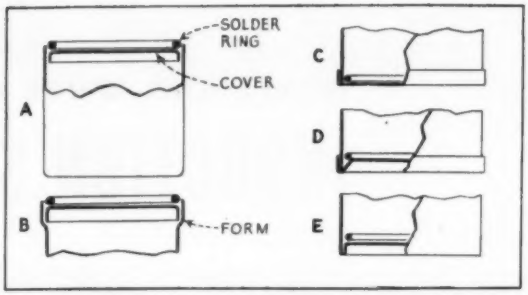
Gang Setup.. Various relay covers and housings are soldered together, six at a time, in this multiple setup. Only the locating plate is changed to suit the job. Both cover and housing are tin plate. Assemblies shown have a projecting tube, held in tension during soldering by individual spring-operated plates, mounted in sets of three to two toggle clamps. Parts of the assembly are shown at lower right, while assemblies in the coil are in heating position



Coil Arrangement.. Can *A* is placed in a counterbored transite plate that centralizes it in the coil The relay, assembled on the cover, is placed inside and topped by a preformed solder ring. When heated to melting temperature, the solder seals the entire joint airtight. When the cover fits over the can, the solder ring is placed inside, as at *B*, and the work located from above in a non-metallic support. If pressure is required, the arrangement at *C* is used. Here a top collar is soldered on at the same time as the cover, so two solder rings are used. In any of these cases, heating time is 4 to 6 sec

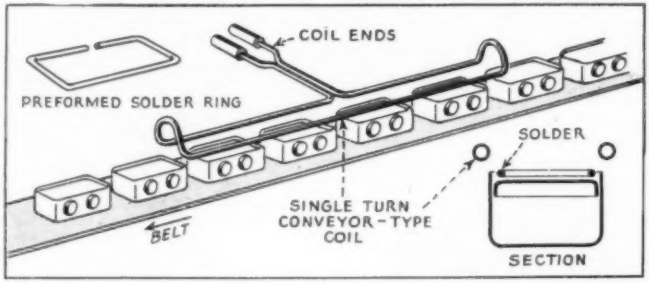


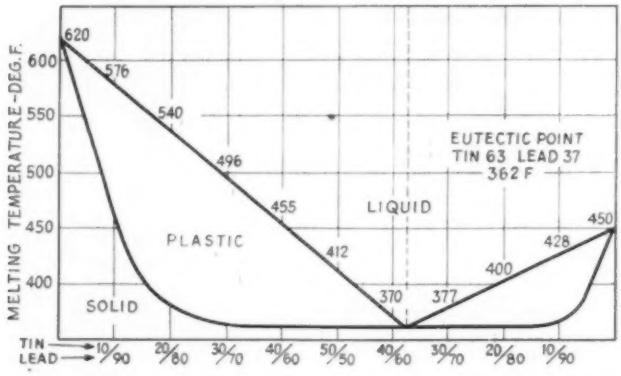
Preforming Rings.. Wire solder can be preformed to a desired shape by winding on a suitable mandrel. A keyway permits cutting the turns with shears after winding. Rosin-core solder wire from 1/16 to 1/8 in. or more in diameter can be made into preforms for cans, brass and copper assemblies and tubular products, simplifying solder placement and assuring a uniform amount



Choose Joint Type.. Proper joint design aids assembly and assures proper solder distribution. When the cover goes inside, *A*, location is difficult without some internal stop such as the relay shown earlier. A formed end, *B*, locates the cover at proper depth and provides a stop for the solder if cover fit is loose on one side. With the cover outside, *C*, the solder ring can go inside; but a better design, *D*, provides a recess into which molten solder can run so it is drawn into the seam. An inverted cover inside *E*, also facilitates assembly, because the solder is inside and runs naturally into the seam and the cover can be located easily, flush with the housing edge

Conveyorize for Speed.. Tin-plate assemblies can be induction-soldered so fast that conveyorizing is sensible. A single-turn conveyor-type coil can then be positioned over a work-feeding belt. Here is a typical example—a condenser can, into which the top is soldered (lower right) with a preform ring (upper left). Small and medium-size condensers can be soldered with rosin-core preforms at a rate of 60 to 80 per min with a 5-kw output generator





Tin-lead Solders Have Three States.. The "eutectic" alloy, 63% tin and 37% lead, melts at 362 F and becomes a liquid within a few degrees. Others become semi-liquid or plastic at this temperature, but must be heated somewhat more before they become liquid, as shown here, the amount rising to the maximum when either pure metal is attained. For induction soldering, the best solder usually is one with a narrow plastic range, so joints have no chance to open from vibration, wrong style of joint or over-all temperature differentials during setting

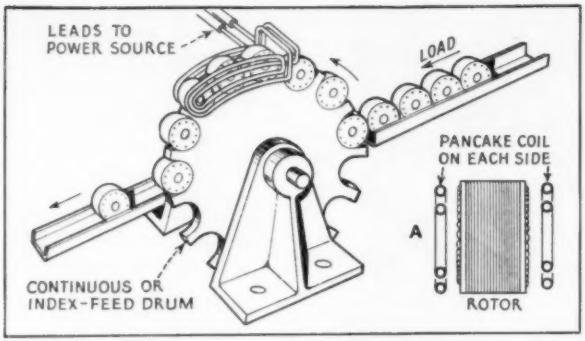
INDUCTION SOLDERING...

continued

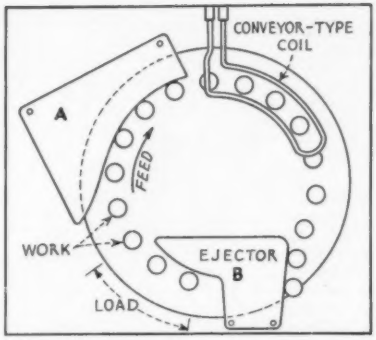
or may be incorporated in the solder, such as in acid- or rosin-cored wire. For induction soldering, preformed rings, washers, pellets and shaped ribbon are extensively used. Preforms are easy to apply, avoid waste and insure uniform results.

Material characteristics. Some metals solder more readily than others, depending on their ability to absorb and conduct heat, and their order of so-called "solderability" characteristics: silver, copper, brass, iron and steel. Where thermal conduction of a metal is high, the speed with which induction heat can be applied locally becomes helpful.

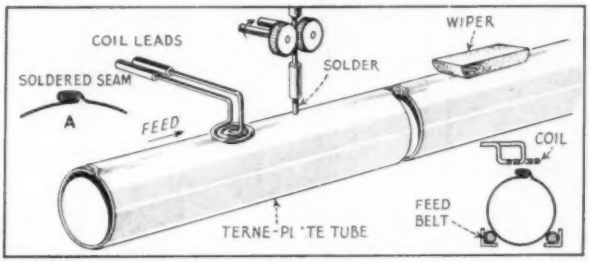
Coil Design. Of great importance is the relation of the coil to the work; the coil should elevate the temperature of all sections evenly. With parts of uniform thickness, heat distribu-



Drum Feed.. End plates are soldered on small squirrel-cage rotors in a drum setup. Heat of 450 F causes the pretinned surfaces of the end plates to reflow uniformly around the conductors and form a satisfactory bond. This avoids the excess solder that results from lead-bath dipping. Rotors feed from an inclined track onto slots in a transite drum, then are carried up and through a double pancake coil, as at *A*. Drum feed may be continuous or progressive, as required. Soldered rotors simply fall out onto an ejection track. Feed rate is set by drum speed, if continuous, or by cycle of a geneva motion, if intermittent. On small rotors, output can be 600 pieces per hour



Rotary or Dial Feed.. This typical setup has fixed plate *A* to guide work into proper position on the rotary feed table so work will be aligned and will pass centrally through the coil. After work passes through the coil, it is ejected by plate *B*. Such a fixture is suitable for assemblies that will stand up and will slide without tipping. Table and plates *A* and *B* are of asbestos board



Continuous Seaming.. Seams on terne-plate tube or a series of cans may be soldered progressively by passing the seam under a pancake coil, then feeding wire solder by knurled rolls through a non-metallic guide tube. As induction heat penetrates all layers uniformly, solder is uniformly distributed through the double-lap joint *A*. A wiper smoothes the surface and removes excess solder. Tube or can is fed by a pair of round belts in angle-iron guides. With a small generator, feed can be 2 fpm; with a large one, a multiple series-type coil will solder three or four rows simultaneously

tion is easily controlled. With heavy and thick parts, the coil should direct its energy to the heavier mass. Sometimes heat should be applied to one part, such as the one with the largest area, and the other part heated by conduction. Most metal assemblies can be handled with simplified coils, but when shapes become involved, analysis of heat distribution becomes advisable. Variables that affect heat distribution usually can be controlled by modifications in coil spacings or shape.

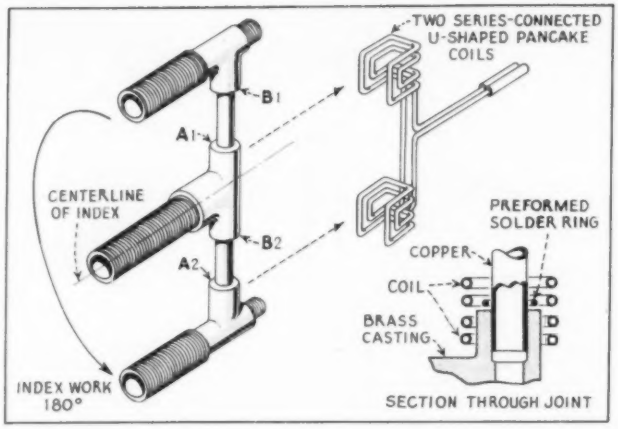
Fixtures. Induction soldering can cover a wide range of needs, from simple assemblies to those requiring several joints. Fixture needs vary from ordinary nests, or studs to centralize the work in a coil, to automatic devices that apply flux and solder, and feed work through or adjacent to coils. As a rule, exceptionally inexpensive fixtures can be made; only in a small percentage of cases is automatic handling essential.

Solder Types

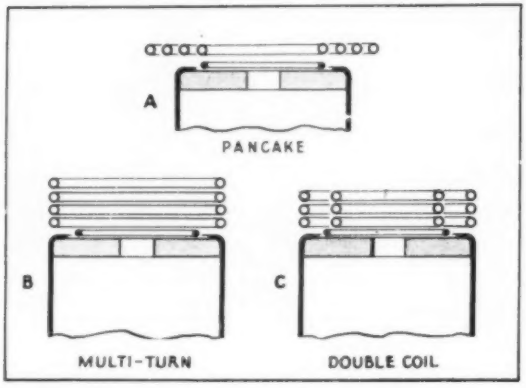
No one solder is universally satisfactory. Usually experience from one job will be helpful in solving similar problems, but with wide variation in joint, materials or cross-sectional areas, different combinations should be tried. The straight tin-lead alloys will most likely be suited, but for the difficult jobs special alloys can be considered. Some solders contain antimony in small amounts, which increases strength but makes the joint somewhat more brittle. Other solder alloys include small amounts of copper, zinc, silver, or cadmium, but seldom are superior to tin-lead alloys for induction soldering, if proper attention has been given to cleaning of the parts, correct fitting and heat distribution.

Flux Is Important

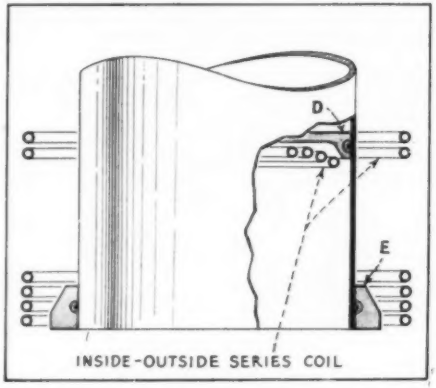
As important as the solder is the flux; no flux will work satisfactorily under all conditions. There are two types of fluxes, corrosive and non-corrosive. Their purpose is (1) to remove surface films and to assist in keeping the surface clean and thus prevent oxidation, (2) to promote heat transfer within the joint, (3) to reduce tension between the solder and the metal so proper wetting of the solder results, and (4) to assist in alloying the surfaces being joined. Fluxes, therefore, are judged according to their abil-



U-shaped Coils.. When the coil cannot conveniently surround the joint, as on these plumbing fixtures, U-shaped pancake coils will surround enough of the joint to insure current circulation around it and consequent uniform heating. Solder is preformed to U-shape and bent into a circle at assembly. In this case, joints A1 and A2 are soldered, then the assembly is rotated 180° and joints B1 and B2 soldered. The holding fixture is mounted on a slide so work can be moved into the coil when ready. Such a setup can handle 90 to 100 assemblies per hour



Brass Assemblies.. To solder non-ferrous metals such as brass or other copper alloys, high-impedance (several-turn) coils are required to insure higher current circulation in the work coil and thus to promote more energy transfer from coil to work. A single-turn coil is inefficient and heating slow, because the resistivity of brass is low and permeability is unity. Multiturn pancake coil *A* would transfer energy to the insert and cause faster heat acceleration than a single- or 2-turn coil. A helix coil *B*, with several turns close together, will do the same thing, or a double coil *C*, may prove suitable. In any case, the coil must be coupled as closely as possible to the work



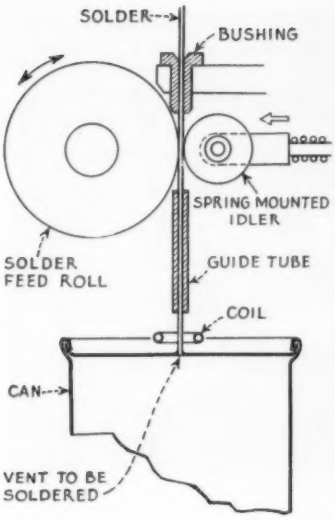
Heavy and Light Non-Ferrous Sections.. Coils must be arranged to provide maximum energy to the heavier areas when a heavy non-ferrous section is soldered to a light one. For the insert at *D*, an internal coil might be enough, but a single- or multi-turn coil can be put in series outside if heat is needed there. The outside coil is coupled more loosely than the inside one, to insure uniform heating. To solder the ring at *E*, an outside helical coil, set as shown, should be sufficient, because most of the energy is directed to the heavier member

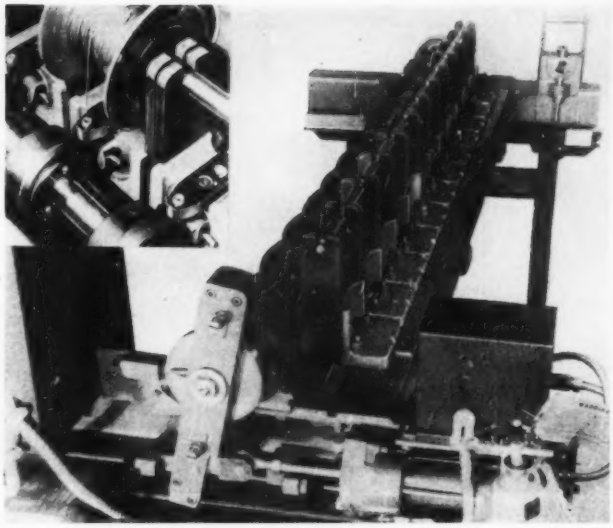
ity to perform all these functions.

Corrosive fluxes, usually called acid types, contain zinc chloride, or such acids as ammonium or calcium. A zinc chloride flux is fast acting and effective in removing surface film and oxidation, but is corrosive and leaves a residue often difficult to remove, and which in time may promote further corrosion. In electrical assemblies, this residue is conductive and sometimes leads to product failures.

Non-corrosive fluxes, usually of the rosin type, are most commonly used for soldering because they do not leave a harmful residue and are not conductive. A rosin flux is slightly weaker than an acid flux, but if properly applied and with clean, well-fitted joint surfaces, it will be found satisfactory for most of the usual purposes.

Special fluxes are available for such materials as stainless steel, where a more active agent is needed to prevent oxidation and to promote proper alloying. This is also true for aluminum, but results so far have been limited, because aluminum solders lack the flow characteristics needed to make induction heat practical.





Vent Holes.. Vent holes in filled cans of food (such as dried milk) can be sealed automatically at a rate of 4 cans per sec. The fixture bridges an indexing conveyor, which brings 12 cans into heating position at each index. Solder wire is fed from spools through guide bushings past feed rolls on a common shaft (closeup) oscillated by an air cylinder and crank to clear cans for indexing. Actual solder feed is predetermined by setting a ratchet on the crank. A spring-mounted idler roll holds the solder against the feed roll (sketch)

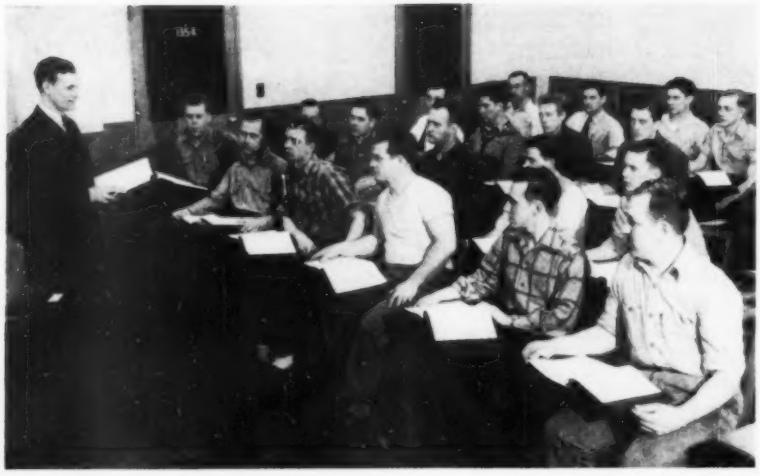
Tips FOR TOP SHOP MEN

288 Prejudice is usually blind ignorance. Sooner or later, the man who retains prejudices runs into trouble—and shows his inability to educate himself out of his narrowness.

289 Every man should have some incentive—a better job, better pay, more time off, increased recognition, or some such. Why limit incentives to production workers? The staff and indirect men can perish of neglect just as easily.

290 When you face a problem, work out the best solution you can before you "go upstairs" for help. Some top executives like to pontificate, and resent an assistant with an answer, but most appreciate this evidence of your interest. Further, given your solution, the Boss may go on to a better one; without it he may get only as far as you did.

"I made it half size — just like the drawing says."



CLASSROOM WORK *is partly at the Tapco plant, partly of a nearby high school. Conducting this class at Tapco is the author, T. J. Haas*

AS THE TWIG IS BENT . . .

Thorough shop training, classroom work, and a rounded social program combine to provide a steady supply of competent apprentices

By T. J. HAAS, Manager of Trade Training
THOMPSON PRODUCTS, INC.

APPRENTICE training has received serious attention at Thompson Products since 1936. The industrial training program that developed before the war attracted wide attention as a model for such training courses.

This program ran into draft trouble in 1943 and was suspended for the remainder of the war. When it resumed in 1946, the company had its previous experience to draw on, plus much that had been learned about training in the meantime. As it stands today, we believe that it is a better program than ever.

The course is in manufacturing practices, based on the craft of machinist as approved by the Ohio State Apprenticeship Council. In the class starting each year there are normally 12 men for the four-year course.

When we resumed in 1946 it was with the men who left for the armed forces in 1943 that had returned to the company. Of the 43 now enrolled, 41 are veterans—including four who were disabled during the war. Prior to the war most of the entering students came directly from high school. After the war new classes were largely drawn from the plant. The latest class to start was divided about 50-50 between the two sources.

There were 250 applicants for the present freshman class, and in some years there have been as many as 300. Applicants must be between 17 and 21 and have resided in the Greater Cleveland area for at least three months. They must be high-school graduates of excellent character with at least a year each of algebra, machine-shop practice, mechanical drawing, and physics. Lacking one of these subjects, allowance can be made for chemistry, electricity, foundry, or patternmaking. Applicants must be citizens. Compositions on assigned topics, physical examinations, letters of reference, information gleaned from personal interviews, and tests administered to applicants all contribute information of value in selecting those best qualified.

We have been fortunate in the large number of applicants. This has made the selection of men a difficult task, but it has assured high-caliber choices.

Six Months Probation

The first six months represent a probationary period at the end of which an Apprenticeship Agreement is executed, covering the remaining 3½ years. Apprentices are paid an hourly rate starting at 96¢ and increasing every three months to $1.51 during the last quarter of the fourth year. The rate of pay is altered when necessary to conform with wage increases generally applicable to company employees. Part of the class instruction is after work-

SCHEDULE OF SHOP EXPERIENCE

TYPE OF TRAINING		DEPARTMENT	MONTHS
FIRST YEAR			
First Term:			
Machine Repair, Instrument Repair, Millwright	Any one	Maintenance	3
Shaper		Toolroom	3
Second Term:			
Lathe		Toolroom	3
Milling Machine, Grinder	Any one	Production	3
SECOND YEAR			
Third Term:			
Milling Machine	Any two	Toolroom	6
Boring Mill, Planer		Toolroom	
Tool Setup		Production	
Fourth Term:			
Plant Layout	Any two	Industrial Eng.	6
Surface Grinding		Toolroom	
Universal Grinding		Toolroom	
THIRD YEAR			
Fifth Term:			
Gages and Templets		Toolroom	3
Tool Checking		Toolroom	3
Sixth Term:			
Drafting		Tool Design	3
Tool Setup		Exp. Process Eng.	3
FOURTH YEAR			
Seventh Term:			
Time Study		Industrial Eng.	3
Heat-Treating		Production	3
Eighth Term:			
Turret Lathe	Any two	Production	6
Automatic Screw Machine		Production	
Grinding		Production	

***LATHE OPERATION** is studied in the shop for three months by freshmen. Similar time is devoted to the other basic machine tools during the course*

***FRESHMAN INITIATION** to the Tyee Pongo Club marks beginning of social program for the apprentices*

ing hours and apprentices are not paid for this time. If apprentices are required to work overtime they are paid overtime rates in accordance with existing wage agreements.

Shop training is given throughout the course, as shown in the schedule, starting with such work as machine and instrument repair, and ranging through most engineering and manufacturing departments.

Correlated classroom instruction originally was given at the company's Clarkwood plant in Cleveland, and later at East Technical High School and Case Institute of Technology. Subsequently, with the program set up in the larger Tapco plant in suburban Euclid, we were successful in interesting the Euclid Central High School in adult education and courses have now been established there which are taken by the apprentices. In addition, classes in shop practice, math, drawing, and tool design are given at the Tapco plant.

Some time is devoted each month to discussion of such subjects as safety, labor relations, history of industrial development, and company methods, practices, and improvements.

During the senior year each man works on an assigned project. Last year these projects were studies of materials handling in the various divisions. These reports include an analysis of present methods and recommendations for improvement.

Although a sound apprentice training program must be built around thorough shop training and classroom work, this is only the beginning.

From its establishment by Ray Livingstone, now vice president in charge of personnel, the industrial training program has had the benefit of fine cooperation from both management and labor. These are essential for a successful apprentice course.

Although it is the intention of the course to develop men who will advance through the manufacturing end of the business, there is no intention to deprive other employees of this opportunity. As long as this is thoroughly understood there need be no friction between the apprentices and the regular employees of the company.

RELATED CLASSROOM INSTRUCTION

SUBJECT	DAYS	TIME	PLACE
FIRST YEAR			
Algebra	Mon—Thurs.	4:00 to 5:30	High School
Trigonometry	Mon.—Thurs.	5:30 to 7:00	High School
Manufacturing and Shop Practices	Tues.	3:30 to 5:00	Plant
SECOND YEAR			
English	Mon.—Wed.	4:00 to 5:30	High School
Physics	Mon.—Wed.	5:30 to 7:00	High School
Shop Practice and Shop Math	Thurs.	3:30 to 5:00	Plant
THIRD YEAR			
Chemistry	Tues.—Thurs.	4:00 to 5:30	High School
Mechanics and Strength of Materials	Tues—Thurs.	5:30 to 7:00	High School
Shop Theory and Tool Design	Mon.	3:30 to 5:00	Plant
FOURTH YEAR			
Metallurgy	Tues—Thurs.	4:00 to 5:30	High School
Business Organization and Factory Management	Tues—Thurs.	5:30 to 7:00	High School
Tool Design	Fri.	3:30 to 5:00	Plant

An unusual social program has developed along with the training course. This has been invaluable in developing a "school spirit" among the apprentices and building personal traits that will prove valuable to those who assume positions of leadership. The apprentices have their own club—The Tyee Pongo—complete with initiations, monthly meetings, dances, and other forms of recreation. This program culminated last year in a graduation dance at the Lake Shore Country Club.

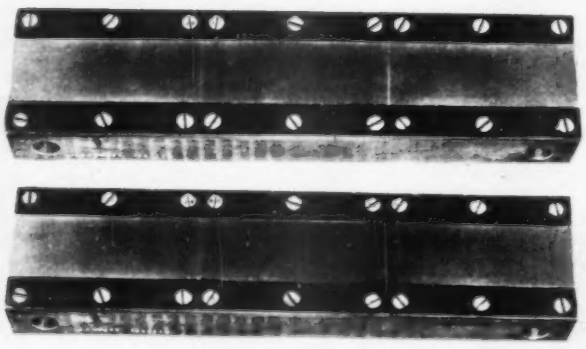
Graduation exercises were held in June of last year at the plant, followed by a reception. Apprentices who complete the course receive a diploma, a certificate of completion of apprenticeship from the Ohio State Apprenticeship Council, a class ring, and a bonus of $100.

***PLANT LAYOUT** is shop course taken by some of the apprentices in their sophomore year*

The results of the program to date have been impressive. About 85% of the graduates are still with the company. Many earlier gradutes now hold positions as foremen and supervisors.

Our aim has been to assure a steady supply of trained young men for the manufacturing divisions of the company. The graduates of this course are men carefully screened in selection, who are thoroughly trained in our manufacturing operations, and who possess a full understanding of company policies and organization. They are well fitted for the positions of responsibility many of them already hold.

Carbide Replaces Steel for Razor-Blade Tempering

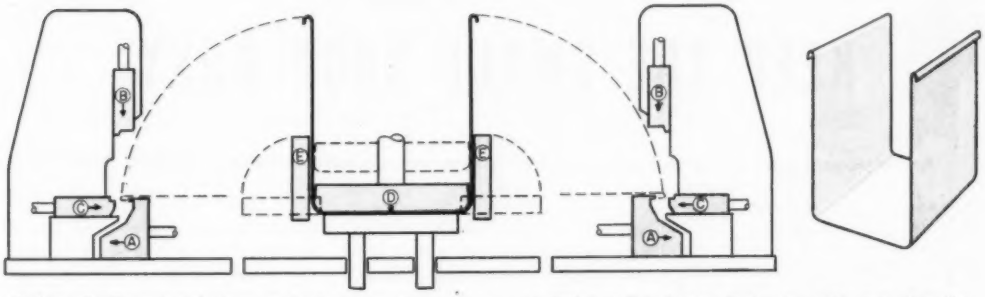


RAZOR-BLADE steel stock is quenched by passing it between two sets of water-cooled blocks and pressing the blocks together. Flat contact conducts the heat away at a controlled rate to produce the right temper in the high-quality steel. Originally these blocks were steel, but they became scratched and softened, which produced spotty tempering. Blocks are now made by screwing cemented-carbide faces to brass or cast-iron water jackets.

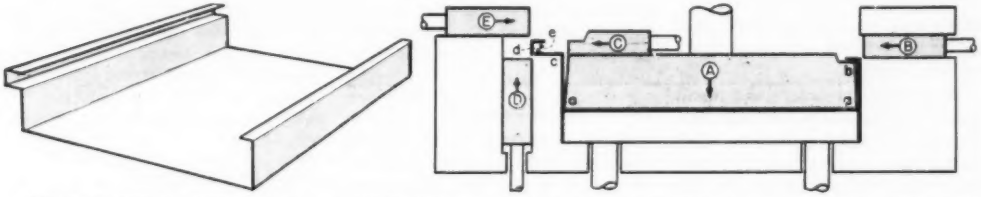
Pressless Dies Operate In Sequence

Self-operated dies, first applied to forming refrigerator cases, now utilized in complex forming of dishwasher and other sheet parts

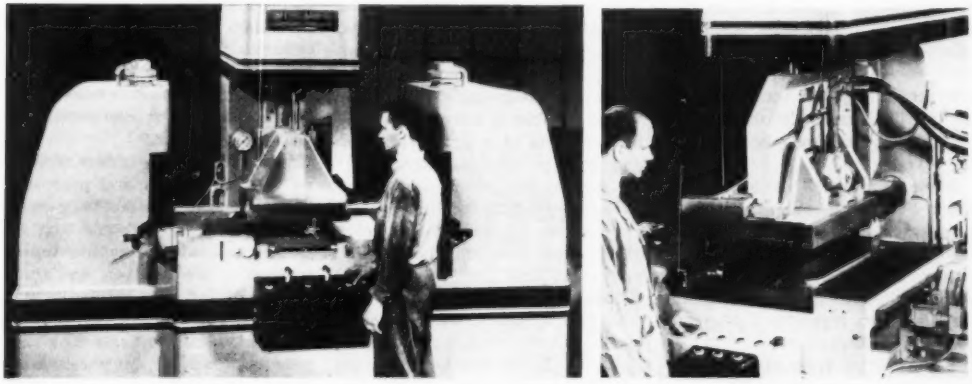
BY CYRIL BATH, President
THE CYRIL BATH CO., CLEVELAND



U-shape Section—A flat piece of stock is placed on the "table," and slides *A*, each with a forming lip, move into position. Slides *B* then descend to hold the stock and to begin the end curl. Slides *C* then move in to complete the curl. Slides *C*, *B* and *A*, in that order, retract to clear the sheet ends. Ram punch *D* descends to the work, then presses down the cushion pad beneath. This also tilts rocking plates *E* to tangent-bend the lower-corner radii



Extra Ram Motions—Here ram die *A* descends first, to grip the work on a cushion pad and form channel bends *a*. Then slides *B* and *C* (latter on the ram) make bends *b* and *c* simultaneously. Slide *D* then rises to make bend *d*, and is followed by slide *E* to complete the bend over slide *C* as a form. All motions are hydraulic and electrically interlocked. Elaborations of this method can shift work between bends. Units are for long-run production



Dies Are Self-actuated—If a die is provided with hydraulic or other pressure-applying elements, a sequence of operations may be performed, such as those involved in making a case or a wrap-around bumper. The machine—really a supporting framework—actually functions primarily as a holding device. Here are two machines of this type which form a dishwasher top. The sequence of operations is shown in the accompanying sketches

ORDERS KEEP THE SMALL SHOP BUSY

An intelligent plan for bringing in business is a prime requisite for sound business health

BY H. S. CHANDLER

ONE OF the most romantic segments of industrial life is the small machine shop. Celebrated in comic cartoon and magazine success stories, our small contract-shop proprietor is one of the finest symbols of American "go-gettiveness" and Yankee ingenuity. Yet today he is faced with a struggle for existence.

Because of its nature, the small machine shop has all its facilities pointed toward production. The proprietor is nearly always a former toolroom foreman who has felt the urge and has possessed the drive to get started in a business of his own. His whole life has been spent in mastering his trade. The business of sales, exploitation, and merchandising is one that he has yet to learn. If he started his business just before the war, he didn't have to sell. The capable small producer during the war could get all the business he could handle.

But what has happened since the war's end?

Some of the fine little machine shops have gone out of business. In most cases the owners threw in the sponge after a succession of unhappy attempts to manufacture and merchandise gadgets and items ranging from cigarette lighters to pressure cookers.

Some shops resisted the siren call of the promoter, held on to their war-won money, and stayed where they belonged—in the contract business. However, the going has been tough since 1946. Competition and inability to sell himself profitably has made it difficult for even the experienced old-timer to draw a living from his formerly thriving machine shop.

In his attempts to get business, the small machine shop proprietor who is not as long on sales as he is on mechanical ability will do well to consider the following suggestions.

First—Get a Salesman

If you can afford the investment that goes with the employment of an exclusive full-time representative—fine! If not, then a manufacturer's representative handling one or two non-competitive lines will have to do. But mark the qualifications below.

Your man should have a good mechanical background. He must know how to read a piece or tool print. He should know his way around a shop—*your* shop. He should be able to discuss the technical aspects of a prospective job and perhaps offer intelligent suggestions to the purchasing agent. (We take for granted that he will have a pair of stout shoes and a desensitized skin, together with a pair of rubbers and an umbrella.)

Your salesman should have your complete trust and confidence. If he does not merit it, he is no good for you. If he merits it, go the whole hog with him. Do not discourage him with house accounts. The institution of the house account is built on penny-wise-pound-foolish policy. The house account that is not serviced aggressively becomes dormant and then dead. Work with your salesman as though he were a partner. That way, you will both make money.

Explore the possibility of a part-time representative away from your own city or area. This business, if you can get it, is pure gravy. If you can stress something special in your presentation, it would be most worthwhile to make this effort.

What Do You Offer?

A sales campaign should be planned. Your effort should be based on what you have to offer. What do you have that the competing shops do not have? What do you have that the prospect's own shop lacks?

Facilities?—know how?—delivery? The man on the firing line should know which is not important and when it is most important. Lay proper stress.

Advertise. Write letters directly to your customers and prospects. The letters should not be general broadsides. They should contain information of specific and timely interest to the receiver. Use trade magazines of the industries you desire to reach and which may be most active at the time. The specific approach or appeal is best. Your advertisement, no matter how large or how small, should describe a specific service, operation, or part. For this reason, the

trade publications are best. It costs little to keep your prospects familiar with your name and service.

With your salesman, survey your plant and facilities from the viewpoint of today's requirements. Note the companies that are busy. What can you do to get some of that business?

Consider, for example, chassis, panels, transformer cases. Will a comparatively small investment for perhaps an adjustable-die setup permit you to compete for that small-run, but profitable, business?

Check Your Accounts

Get out your list of old accounts —not just the high spots. What about that auto accessory jobber you built that die for two years ago? These are the days when the low-price, volume numbers are returning to the shelves. There is money in tooling for them. Sit down with the jobber and talk it over.

Fine-comb those old accounts. The metal novelty boys are cutting prices. They will need better tools and dies, and assembly fixtures to do it. Call on them all.

Competition often is hot and heavy. But the cold canvass, the follow-up, and the intelligent presentation of your best points will generate at least an opportunity to bid.

When calling on the big companies it is wise to become friendly with the project engineers. They are the boys who actually handle the getting out of the job. The buyer's line of least resistance is to follow the project engineer's recommendations when ordering. They have the engineers' interest in a good supplier. They can quickly spot a man who knows his business. A good idea is to wire a small machined piece to a tag carrying your name, some engineering information about the piece, and the price. This should be done without going over the buyer's head. It would be good to have the buyer arrange the introduction.

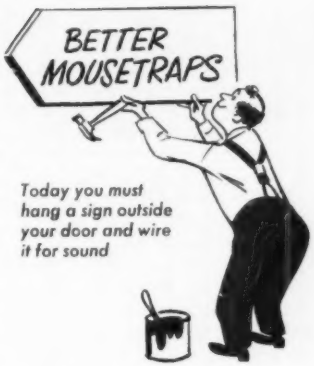
The importance of the follow-up cannot be stressed too greatly. See your buyer—and see him again and again. Tell him something new about your shop each time.

When you get your first opportunity to bid, examine the drawings carefully. Is there a suggestion you can make which will cut a corner and some cost? Remember, you are a specialist. You know more about a greater diversity of metal fabrication than the buyer or project engineer who sees only part of the picture. Do not be modest about this. It is the most important thing you have. Anyone can possess machinery. Mechanical ingenuity cannot be had as easily. Emphasize this and demonstrate your background on the customer's requirements.

For the long pull, the host of smaller accounts will prove most fruitful. They need your special contracting skill even more than the big fellows. Familiarize yourself with their products. Let them know you are ready to help in new product development. However, do not offer your services for nothing. Prudence and familiarity with your customer will indicate how far you can go in giving service before the purchase order is transmitted. Your contract shop can, and should, be an adjunct to the merchant-jobber's business.

Keep up to date. Read the current technical and engineering periodicals. They are a rich source of ideas for presentation to your customers—and a fruitful source of business leads.

A last word. The machine shop



Today you must hang a sign outside your door and wire it for sound

proprietor must forget his contempt—silent or not—for the merchant and promoter. He must become a builder of sales. He must apply himself to the mastery of this aspect of today's business.

The day when the world would beat a path to your door is gone. Today you must hang a sign outside your door and wire it for sound. Your front office is as important as is the jig borer you at long last could afford to buy—and now could ill afford to be without. The shop that has to button up a jig on a lathe faceplate is no further behind the times than a shop that has no planned sales effort.

The small contract machine shop satisfies a real need. The shop that seeks out that need and knows how to fill it will be busy and make profits.

WORK PROGRESS SHEET

	DATE	ORDER NO.	DRG. NO.	ITEM NO.	QUANTITY	NAME	RECD.	CUT OFF	FORGE	LAYOUT 1	LAYOUT 2	LAYOUT 3	PLANE	SLOT	BORE	TURN	DRILL	SHAPE	MILL	INSPECT	HARDEN	GRIND	ASSEMBLE	INSPECT	P/O	PROMISE	REMARKS
										10-22	10-24		11-1	11-10			12-3						12-4				
										10-20	12-1		11-10	11-23			12-6						12-5				
	5-8	68	C 160	1	3	C.S. Housings	1021			11-30	12-2		11-11	11-29			12-8									12-18	
Operations	L	58	23 L	4	A	I P/O																					
	Layout	Plane	Slot	Drill	Assemble	Inspect Before																					
								11-5	11-10							11-15											
								11-8	11-15							11-21											
	5-8	68	C 161	2	10	3.5 Spindles	Stock	11-9	11-17																	12-8	
Operations	Cut off	Forge	53	L	45	A I P/O																					
			Turn		Mill	Assemble																					
										10-25	11-15	12-4	11-2	11-25			12-15										
										10-30	11-21	12-15	11-2	11-29													
	6-8	69	C 162	6	5	C.S. Crankcases	10-24			11-1	11-22	12-4	11-4	12-3												12-28	
Operations	L	58	L	23	L	4 A I P/O																					
		Plane		Slot		Drill Assemble																					
										10-2	11-4	12-1	11-16		11-28		12-12						12-21				
										10-6	11-14	12-10	11-23		11-30		12-8										
	6-8	69	C 163	7	4	C.I. Cylinders	10-1			10-11	11-15	12-11	11-30		11-3		12-13									12-28	
Operations	L	57	L	58	L	40 A I P/O																					
		Saw		Plane		Drill Assemble																					
									11-4																		
	6-8	69	C 164	8	8	14 S. Flanges	Stock																			12-21	
Operations	Cut off	53	L 4	A	I	P/O																					
		Turn		Drill Assemble																							

Work progress sheet is a master record that shows the status of every job at any time. Operations on each item are denoted by numbers or letters listed horizontally. Above these entries is the item identification. For each item, three lines are allowed in the operation columns, right, for entering date item was delivered for the operation, date job was started, and date job was completed. Complete record of progress thus is clearly shown

Simple Plan Controls Variety Production

Work-planning for small-lot orders on miscellaneous work is accomplished effectively with a scheme designed to demand but little time from supervision

BY C. D. MACKINNON
LANARKSHIRE, SCOTLAND

DIFFICULTIES peculiar to planning a wide variety of production work in a small shop can be overcome if management adopts a system that is well suited to the needs of this type of operation. I evolved such a scheme some years ago. In the light of experience, the system has been changed and modified until, in its present form, it achieves an operational cost that is the minimum consistent with the intelligent recording of essential information.

Specific objectives met by this system are:

1. It is inexpensive, easily grasped, and easily operated.
2. It relieves foremen of much routine work, freeing them for general supervision. This results in better workmanship, good discipline, and high production.
3. It provides the works manager with a clear and reasonably accurate day-to-day picture of the position of every order on the books—at the cost, to him, of a few hours per week.
4. It reduces the percentage of scrap, keeps deliveries in line with promises, and insures that customers are notified in good time should circumstances prevent the keeping of the original promise.
5. It cuts out man-machine hours lost waiting for work, jigs, tools, gauges—thereby showing a production increase over the practice of relying on work chasers.
6. It is shorn of all non-essentials and represents minimum cost for intelligent recording.

Major elements in the system are a work progress sheet that contains complete production information on every job, a work pool book that indicates the load on each machine and permits establishing the priority of jobs to be done, a work allocation book that guides the progress men in moving jobs from operation to operation, a rack at each production unit that instructs the operator which job to run next, and drawing books for recording the location of each drawing. These elements are tied together to give an over-all procedure for planning production and advancing work through the shop.

In a shop employing two to three hundred people, the following per-

sonnel is ample to work the scheme: two girls, preferably in a room adjoining the works manager's office, and responsible for the office side; one girl, in a centrally located site in the shop, responsible for all shop drawings; one progress man and helper moving the work around the shop.

One of the girls divides her time between work progress and receipt and dispatch of goods. On the progress side she enters all new orders on the sheets and lists the appropriate drawings before passing them on to the shops, along with the necessary order forms. The chief progress girl goes around the shops each morning, noting the position of every job in progress. She later transfers this information to the progress sheets. The drawings girl in the shop receives from the office all shop copies of drawings relating to new orders, issues and receives all drawings in use, and can trace any shop copy.

Operating the System

New orders and drawings are delivered to the works manager who looks them over and passes them to a girl clerk. The order number and drawing number are marked on the reverse face of each drawing at each corner so identification is rapid and easy no matter how the drawing may be folded, rolled, or racked.

New order numbers are now entered on the progress sheets along with quantity and other details copied from lists on the drawing. New drawings are entered in the office drawings book and office copies of new orders are filed.

Office copies of new drawings, however, lie on the table for further attention. This consists of the works manager scanning the drawings to decide what operations are involved on the new parts on order and in what sequence these operations should be executed. He conveys this information to the girl, who enters the operations in sequence, in red, immediately under each new-order entry on the sheets.

For example, the entry on the top line of the progress sheet is order 68, item 1, cast steel housings, three required. Immediately below on the *operations* line are the entries *L*, 58, 23, *L*, 4, *A*, *I*, and *D/D*. *L* means layout, 58 is a planer, 23 a slotting machine, 4 a drilling machine, and the remaining operations are *assemble*, *inspect* and *deliver*.

In the illustration, *layout*, *plane*, *slot*, *drill*, and so on, have been filled in under the *operations* line for the convenience of the reader. In actual practice this is not done as all concerned are familiar with plant numbers. When the works manager dictates operations, he also fixes promise dates which are entered in the next-to-last column on the right-hand side of the work progress sheet.

Work Pool Book

In conjunction with the work progress sheets, the work pool books are used by the progress girl. They contain the plant number of every machine or production unit in the shops, having one page, or more, for each unit according to the volume of work awaiting execution at a given machine.

When the girl is working on the sheets, extending orders in operation, she enters in the work pool book *every job* for which material is on hand. Hence the book is the feed for the plant, and it is from this fact that the book gets its name.

A glance at the pool book shows four columns on the right, headed *number of operations*, *promise*, *priority*, and *next operation*. After noting from the progress sheets particulars of a new order and entering them in the first four columns on the left of the work pool book the girl turns again to the sheets, to learn from the operations line how many operations are involved in that order and the delivery promise date.

This information she enters in the appropriate columns of the work pool book. With the *number of operations* and the *promise* columns filled in for each entry, priorities can be fixed by noting the entries that combine the earliest promise dates with the largest number of operations and casting them for the highest priorities.

WORK POOL BOOK — PLANING NO. 58

ORDER NO.	DRAWING NO.	ITEM NO.	QUANTITY	NAME	1 NO. OF OPERATIONS	2 PROMISE	3 PRIORITY	4 NEXT OPERATION
68	C.160	1	3	C.S. Housings	7	12-18	1	23 Slot
69	C.162	6	5	C.I. Crossheads	8	12-28	2	Layout
69	C.163	7	4	C.I. Cylinders	8	12-28	3	"
71	C.164	4	8	C.S. Gear bases	8	1-12	4	"
74	C.170	8	4	C.S. Stools	6	1-16	5	23 Slot
75	C.171	2	1	C.S. Lifts	8	1-25	7	4 Drill
77	C.176	5	7	C.S. Bases	7	1-20	6	Layout
78	C.178	9	5	C.I. Arms	5	1-28	8	"

Work pool book shows the load on each machine and permits determining the sequence in which jobs will run. Each production unit is allotted a separate page

WORK ALLOCATION BOOK — PLANING NO. 58

ORDER NO.	DRAWING NO.	ITEM NO.	QUANTITY	NAME	PRIORITY	COMPLETE	NEXT OPERATION
68	C.160	1	3	C.S. Housings	1	11-11	23 Slot
69	C.162	6	5	C.I. Crossheads	2	11-14	Layout
69	C.163	7	4	C.I. Cylinders	3	11-30	"
71	C.164	4	8	C.S. Gear bases	4		"
74	C.170	8	4	C.S. Stools	5		23 Slot
77	C.176	5	7	C.S. Bases	6		Layout

Work allocation book contains instructions for progress men for moving material to next operation. Dates on which jobs are completed are entered by progress men

This method is not, in every case, mathematically correct because an entry with, say, five short, simple operations, promised for May *23* could take less time to complete than, say, an entry with three long, intricate operations promised for May *20*. Such cases are the exception, however, and the works manager, if he supervises the scheme, would, from experience, be on the lookout for such snags. The existing arrangement has the virtue of making possible the fixing of priorities by the progress girl and of causing fewer demands to be made on the works manager's time.

Extending the Progress Sheets

On the work progress sheets, the operations called for are set out in the heading, one column to each—except for layout, which is given three columns. The reason for this will be obvious to production men concerned with variety work where layout operations largely take the place of jigs and fixtures.

Above each order entry on the sheets two lines are left blank for filling in three dates: (1) job was ready for operation, (2) date operation was started, and (3) date operation was completed. These dates are entered in the appropriate operation column and show the progress of the job.

To follow the working of the sheets first consider how a new order is treated. For item *8* in the column headed *received* is the word *stock*, indicating that the mild steel plungers are to be made from bar stock and that the first operation is *cutting off, 11-4*.

Accordingly, the progress girl enters the day's date in the *cutoff* column, locating it on the top blank line above the order entry. This date on the top blank line indicates that item 8 has been entered in the work pool book on one of the pages reserved for the *cutting off* operation. On the progress sheet, on the *operations line*, a small check would be entered before the operation *cutoff*.

The practice of entering a check before a given operation on the appropriate line may seem pointless but to the progress girl it is a most important step. It makes for speed by showing at a glance just how many operations are completed or in progress and, of course, the first plant number, or operation without a check, is always the next operation. That feature is specially useful to, say, the works manager, who may wish to determine the position of a given job quickly.

DRAWINGS BOOK "A" OFFICE

COPIES	DATE	ORDER NO.	DRAWING NO.	OFFICE	SHOP	RETURNED	
3	8-5	68	C100	1	2		
4	8-6	69	C102	1	3		
3	8-6	69	C103	1	2		

DRAWINGS BOOK "B" SHOP

RECEIVED	COPIES	DATE ISSUE	ORDER NO.	DRAWING NO.	ISSUED	CHECK NO.	RETURNED
8-5	2	10-21	68	C100	1	36	
					1	21	
8-6	3	10-24	69	C102	1	15	
					1	90	
					1	79	
8-6	2	10-1	69	C103	1	16	

Drawing books list proper drawings for each order and location of copies. One is held in office, other in shop

All Steps Are Recorded

A further example will suffice to make clear the working of this part of the scheme. Take order number *68*, item *1*, three required, cast steel housings, at the top of the sheet. Looking at the *operations* line and noting the check in front of certain operations we see that the cast steel housings have been laid out, were machined at planer *58*, slotted at machine *23*, laid out a second time, drilled at machine *4*, and are at assembly. Now if we follow the operations columns for item 1, from the column headed *layout* to the one for *assembly*, we see that under assembly the housing was entered in the work pool book on *12-9* and that assembly commenced on *12/15* as noted by the progress girl, making her round of the shops. In the absence from the office of the progress girl, interested parties can, by merely consulting the operations line, rapidly obtain a clear picture of the progress position of any job on the order book.

This record makes it possible to trace in detail the movement of any item. For example, checking item 1: from the column headed *received* we note that the housing castings were received on *10-21* and entered for first layout in that column on *10-22*, layout began on *10-29*, and the operation on the three housings was completed on *10-30*. From the operations line we see that planing at machine 58 is the next operation and in the column headed *plane* we find that the housings were entered on *11-1*, planing was started on *11-10* and completed on *11-11*. All operations may be traced in a similar manner.

The difference in time between the *entered* and *commenced* dates in the operations columns shows the time lag and from the *commenced* and *completed* dates we get the time taken, in rough measurement.

Explaining the foregoing in writing consumes much more time than does the actual operation of extending the progress sheets. A little experience makes the extension a simple and rapid operation.

It should be emphasized that *every* job for which material is on hand is entered in the work pool books as indicated by the top date seen in the operations columns on the progress sheets, and that in the pool books are brought together the results of the work expended on the progress sheets, compactly grouped in the four right-hand columns. The information in the columns headed *number of operations*

and *next operation*, comes from the operations line on the sheets, and the dates shown in the column headed *promise* come from the last *operations* column on the sheets. Figures in *priority* column come from *number of operations* and *promise* columns.

Work Allocation Book

When the work progress sheets and the work pool books have been dealt with, the next step is the work allocation books. Those books are brought to the office only for the purpose of keeping them up to date, a matter of, say, half an hour. Normally they are carried round by the progress man in the shops and the work is moved by him in accordance with the direction they contain.

In moving work the progress man notes each job as finished at a given operation and enters the date of completion in the *complete* column. The column headed *next operation* indicates where the work is to be moved. He supplies the appropriate drawing and makes sure that any special tools, jigs, and gages are made readily available for the next operation and that any similar equipment applicable to the operation just finished is cleaned and returned to the tool store.

At this point the operator concerned with the previous operation is consulted regarding the general condition of such equipment used by him and if repair or modification is called for, the necessary action is taken *before* returning the gear to the tool store. In this way, special equipment is always in good condition when issued.

Unlike the work pool books which contain *all* jobs in progress, the work allocation books are given not more than six jobs, those of the highest priority for each machine or plant number. When bringing the allocation books up to date the progress girl deals with the pool book at the same time.

For example, both pages illustrated are for planer *58*. In the allocations book, item *1* is listed as complete *11-11*. Noting this, the progress girl scores off this item and at the same time scores off item *1* in the work pool book. The same procedure is followed for all items.

The work pool book is now consulted and new entries are made in the work allocation book according to priority. When all the other pages (devoted to slotting, boring, turning, etc.) in both books have been similarly dealt with, the work allocation books are returned to the progress man in the shops. He enters the new priorities on the work allocation racks at the machines, the last link in the chain.

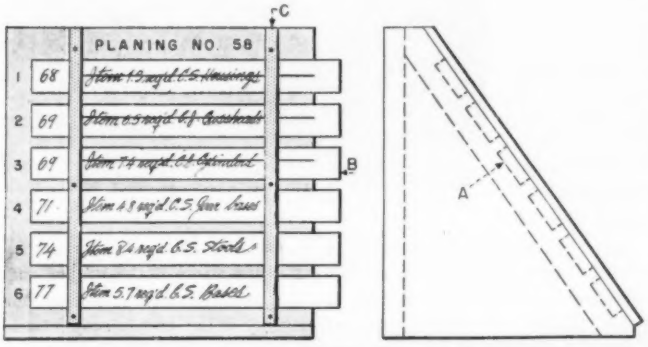
Work Allocation Racks

Each machine or production unit is provided with a work allocation rack made of wood with the front face suitably inclined to insure comfortable reading. Each rack is provided with six recesses designed to take strips of glass cut to size from scrap window glass and sand-blasted to give the necessary dull surface for lead pencil writing. Strips project beyond the rack at the right to provide a suitable finger grip and two light-metal straps hold them in place. The priority numerals, one to six, are constant.

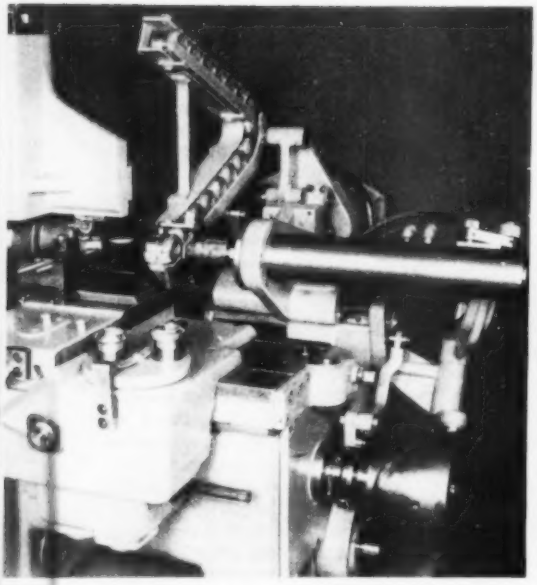
Should priority three become more urgently wanted than number one, number three would be removed, one and two moved down, and three would be slid into recess number one. For revision of priorities this method is much quicker, cleaner, and less liable to error than poorly erased writing on a board.

The progress man keeps a sharp lookout for machines about to change jobs and as each operation is finished, enters the completion date in the work allocation books and scores off the job on the rack at the machine. Each time he gets his books from the office he enters the new priorities on the machine racks and as each job is completed and scored off he makes sure that the necessary drawing, gages, and tools are at hand for an immediate start on the new job. Thus, waiting time is eliminated and should the foreman or the progress man not be at hand when a given job is finished, the operator has merely to consult the work allocation rack to learn which job comes next.

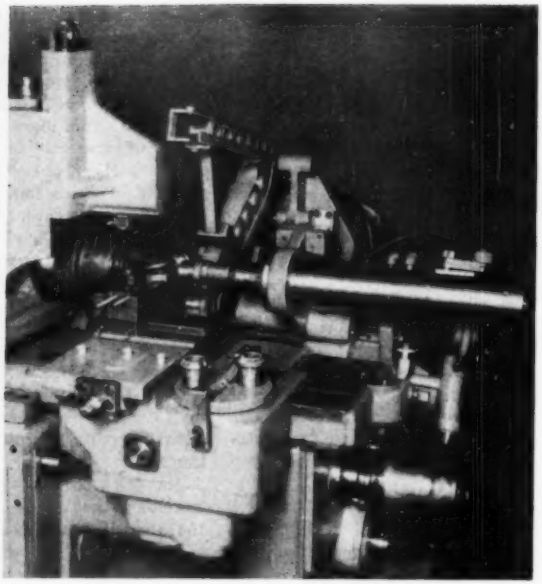
At frequent intervals some firms take a stock of work in progress to ascertain the percentage of work performed on each such order. In this connection the system just outlined makes rapid and easy a task which otherwise might well be long and difficult. The necessary information speedily can be taken from the operations line to the left of the progress sheets. Counting the number of checked operations but one—the last-checked operation will be awaiting operation or in operation—and comparing the count with the number of incomplete operations permits, for all practical purposes, rapid computation of the percentage of work done. Admittedly, the time factor varies with the nature of the operations but to one familiar with the work concerned, arriving at a reasonably accurate assessment is not a difficult task to perform.



Work allocation rack contains removable glass strips instructing operator which job should run next. One rack is provided at each production unit



Automatic loader gravity feeds bronze casting for coupling down to end of hopper where injection chuck, expanded by air cylinder in quill, grips it, then . . .



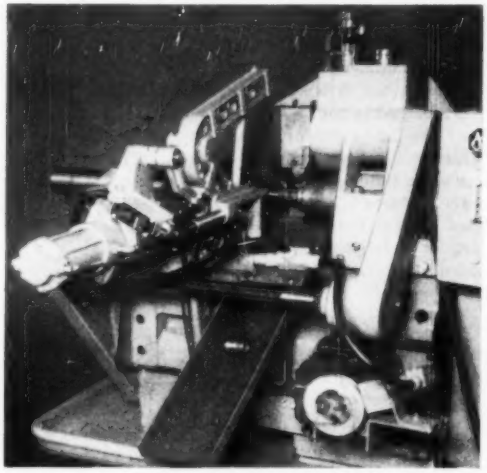
. . . **Headstock mechanism** ejects finished part to unloading finger and hopper pivots to drop below new work held in injection chuck. Controlled by cam at lower right . . .

AUTO-FEED LOADS COUPLINGS INTO HEADSTOCK CHUCK

BY GEORGE E. FOGARTY
Vice President and Sales Manager
SENECA FALLS MACHINE CO.

CASTINGS for bronze couplings in several sizes are handled by an IMP automatic Lo-swing lathe equipped with a special automatic loading device. The flange O. D. is rough-turned, the bore is chamfered, a large radius is formed, and the inside edge of the flange is faced in one continuous operation in which the spindle keeps rotating during loading and unloading.

A small 3-jaw chuck with a garter spring is fitted to the injector quill to grip the parts internally and carry them to the headstock spindle chuck. This occurs during the return stroke of the slides, so no time is lost during loading.

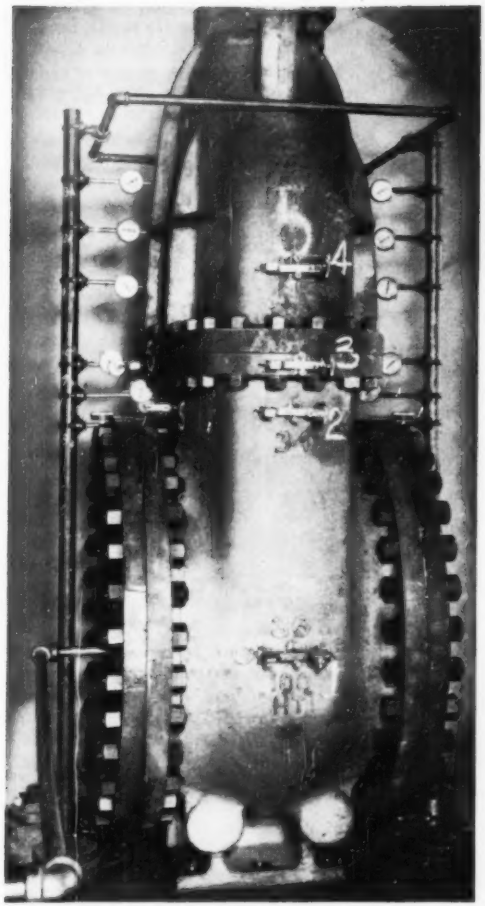


. . . **Injector quill** advances to position new work in rotating chuck and finger turns 90° to drop turned part on chute. Air cylinder at left operates pivoting hopper

Two safety Microswitches are tied in with the machine cycle to stop operations if the hopper and ejector finger are not properly located during the loading phase. Headstock collet and injector chuck must be replaced for different sizes of work, but the loading mechanism is adjustable.

• HOW TO GET YOUR MONEY'S WORTH OUT OF

Dial Indicators



Bursting pressure test of a 36-in. gate valve makes use of a group of indicators located at strategic points to show the amount of deflection of various parts as pressure is applied to simulate working conditions

BY I. A. HUNT, FEDERAL PRODUCTS CORPORATION

EVERY machinist has a working familiarity with the dial indicator, and many profess to be expert in its use. Nevertheless, it is doubtful whether even 10% of all the indicators sold are used to best advantage. In most cases they are applied to one particular job, such as checking concentricity of a piece of stock in a chuck, with no thought given to the scores of other uses to which they could be profitably applied.

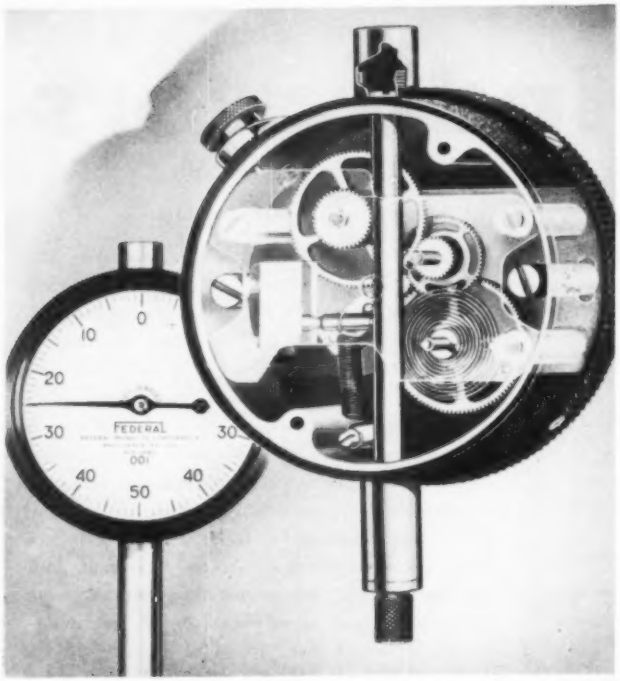
Properly classified as precision instruments because of the high accuracy embodied in their construction and the extreme sensitivity of their operation, dial indicators are, nevertheless, capable of withstanding considerable hard use. This does not imply that they should be thrown around or otherwise abused, but it does mean that they do not have to be handled with kid gloves. They are built for service in machine shops, rather than in laboratories, and although they are well suited for laboratory work, their construction is such that they will maintain their accuracy for many years under relatively rough handling in production shops. And although dials calibrated to 0.001 in. used to be by far the most common, those graduated in 0.0001 in. are more commonly used today. The ratio is about 2 to 1.

An understanding of the operation of an indicator, and ordinary care in handling and setup will prevent most of the imagined errors in the instrument, and ingenuity will develop applications that will enable you to get your money's worth out of them.

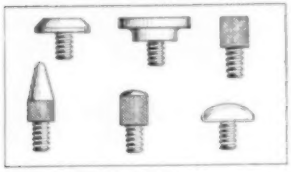
A wide variety of gages, micrometers, calipers, snap, depth and plug gages are available with dial indicators incorporated. Also in daily use are thousands of special gages designed for checking particular jobs, and in which anywhere up to a dozen or more indicators are employed. These are not considered in this report.

Copyright 1949 by McGraw-Hill Publishing Co., 330 W. 42nd St., New York 18, N. Y.

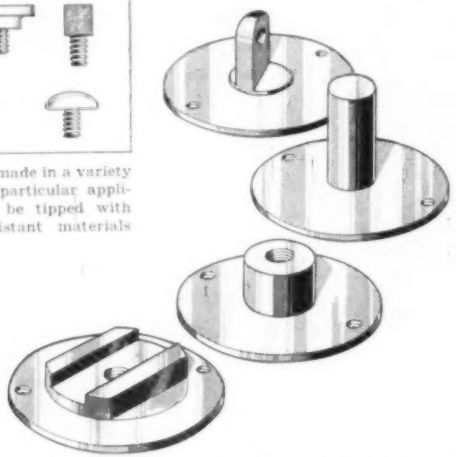
Construction and Maintenance



Internal mechanism of a dial indicator involves a rack and pinion and a train of gears operating in jeweled bearings. A spring holds the spindle in the down position and a hair spring restricts backlash



Contact points are made in a variety of shapes to suit particular applications, and may be tipped with different wear-resistant materials



Proper mounting is important for correct functioning of an indicator. Numerous styles of backs are available to facilitate holding the instrument to the best advantage for the particular application

THE ESSENTIAL "works" of a dial indicator consists of a vertical spindle carrying a fine-tooth rack which engages with a pinion. This, in turn, engages with other gears to form a train terminating in a pointer. The ratio of spindle movement to pointer movement varies with the type of instrument, depending on whether it is calibrated to read in thousandths or tenths of thousandths. A fine hair spring damps the movement and a light coil spring returns the spindle to zero when pressure is removed from the point.

Bearings may be plain or fully jeweled, and where sudden shocks and rough treatment are anticipated, the movement can be provided with a built-in cushioning device to prevent the impact from reaching and damaging the bearings, pivots or gear teeth.

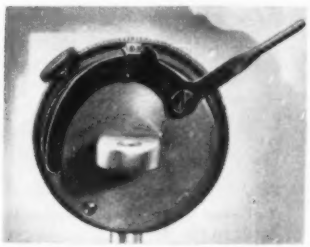
The movement is enclosed in a dustproof metal case having a glass or transparent plastic front. A knurled collar or bezel holds the dial and may be turned right or left to bring the zero mark into desired relationship with the pointer. On some models, a locking screw is provided to prevent accidental movement of the collar. The upper end of the spindle projects through the top of the instrument and is usually protected with a dust cap. The lower end passes through a hollow stem and terminates in a removable point. Points may be had in a variety of shapes and sizes. Where they are subject to excessive wear, points can be tipped with diamond, tungsten carbide, boron carbide, or hard chrome plate. Diamond is, of course, the hardest and will not scratch if properly polished and used carefully, but there is danger of its scratching a high mirror finish if the point is tipped at an angle so a sharp edge is exposed and dragged over the surface. Boron carbide is next to the diamond in hardness and is especially suitable for use on fine finishes as it has less tendency to mark the surface. It has a tendency to crack, chip, or flake when used roughly or in large flat sections. Tungsten carbide is not so hard as boron carbide but will outlast steel many times. It is practical for average gaging, but is somewhat

porous and tends to load up and scratch high finishes after long use. Hard chrome plate can be used on all types of points and is particularly suited for irregularly shaped points. It is well suited for use on high grade, mirror finishes, as there is little tendency for it to mark the surface.

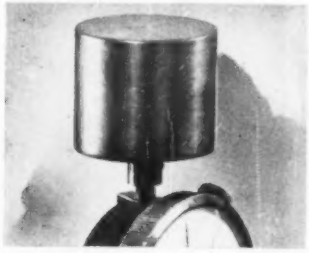
A variety of different styles of backs are available to suit different types of mountings. The commonest is a simple lug, centrally located and drilled for a mounting bolt. Other styles, however, include an offset lug; a solid post; a short, tapped post; an adjustable bracket back; and a plain flat back. Each has its particular advantages to suit the mounting conditions involved, but the central lug type can well be used in most places.

Standard Dimensions

The American Gage Design Committee has standardized the principal physical dimensions of dial indicators in the interests of interchangeability. The total range of point travel has been limited to 2½ revolutions of the indicator pointer to obtain greater uniformity in accuracy. A long range naturally increases the chance for an accumulation of any inaccuracy present in the movement. Although indicators with longer ranges than the AGD standard are necessary to meet the requirements of certain inspection operations, but it is better to use an indicator with an AGD range, if possible, in the interests of greater accuracy.



Lifting lever permits raising the spindle to allow a piece of work to be positioned without danger of damaging the spindle. It is particularly useful for gaging inside depressions



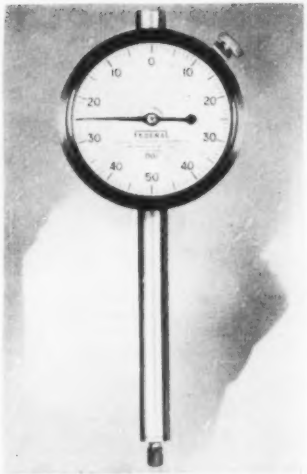
Positive, predetermined pressure can be applied to the spindle by special weights in place of the usual springs when compressible materials are to be measured. Weights are usually made to the different societies' standards: paper, rubber, textile, or other

Types of Dials

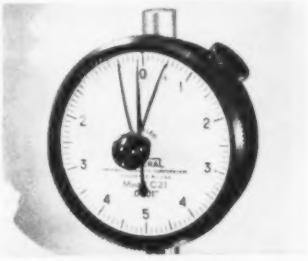
Dials can be had in endless variety, and can be calibrated to 0.010, 0.001, 0.00025, 0.0001, 0.00005, or any other desired inch range, as well as to 0.001, 0.002, 0.005, or 0.010 mm. All kinds of special dials are also available with special markings or with colored sections in place of graduations for less skilled inspection, for greater reading speed, and for sorting material to standardized dimension specifications or other special purposes.

Usually, dials are of the balanced type, having the graduations numbered consecutively on both sides of zero. They are used chiefly as comparators for precisely comparing the dimensions of work with the specified dimensions. Continuous dials have the graduations numbered consecutively around the dial, and are most frequently used for direct measuring, as for measuring distance, thickness, or elongation. Both types may be equipped with double dials and revolution counters, which are particularly useful on long-range indicators. The revolution counter counts off the revolutions of the large hand and so facilitates reading the total measurement. On balanced dials it tells the user which revolution of the large hand he is reading. This prevents mistakes in reading the indicator and is recommended for wider use than is the case at present. The double dial makes it possible to set zero at any required position independent of the revolution counter.

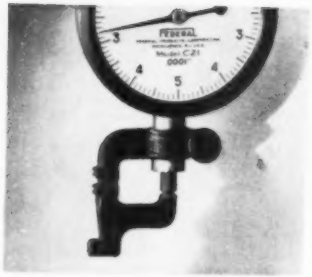
Numerous attachments are available to increase utility of the indicator. A lifting lever, for example, may be attached to the back of the case to retract the contact point when it is required to place the work under the indicator. Weights may be attached to the upper end of the spindle in place of the usual springs. These exert pressure directly through the spindle to the contact point. Such weights are employed when measuring compressible materials such as rubber, textiles, or paper, which should always be measured under constant contact pressure. Similarly, when extremely fragile materials are concerned, lighter re-



Extension stems can be applied to all styles of indicators and are used to advantage when measuring deep cavities or other points beyond the reach of standard instruments



Tolerance hands mark specified limits for any particular dimension. They can be adjusted individually by knurled knobs on the outside of the crystal. It is recommended that they be used more widely as they increase reading speed substantially



Right-angle attachment permits making horizontal measurements with the indicator held in a vertical position. Spring hinge eliminates lost motion

Hole attachment has a pivoted arm with a ball point at each end and is used for checking the inside of a hole or other surfaces out of reach of a regular indicator

turn springs may be incorporated to reduce contact pressure to a minimum. Some pressure, however, is essential to maintain positive contact between the point and the surface of the work being gaged.

Special long stems can be provided for measuring in deep recesses and other places impossible to reach with standard equipment. Oilproof rubber dust caps are available to protect the spindle and prevent excessive oil and dust from entering the case or clogging the spindle. Tolerance hands can also be supplied. These definitely mark the specified limits for any particular dimension, and can be set independent of one another by knurled knobs extending through the crystal.

If readings must be made at right angles to the indicator spindle, a special right-angle offset attachment can be used. This consists of a bracket to be attached to the stem, and a contact arm hinged to the bracket by a flat spring. For testing internal and other surfaces that cannot be reached with the regular indicator spindle, a hole attachment can be used. This is composed of a bracket to be clamped to the stem, and a pivoted arm, one end of which bears on the work surface and the other on the indicator contact point. Both these attachments are so made that they do not affect or delay the operation of the instrument, nor reduce its accuracy. Leverage is 1:1 to avoid any need for specially calibrated dials.

For special applications, indicators may be modified to suit conditions with heat-resisting dials, waterproof housings, heavier or lighter contact pressure, exceptionally long ranges, a brake to hold the hand at its ultimate position, or virtually any other special arrangement that may be desired.

Other Types Available

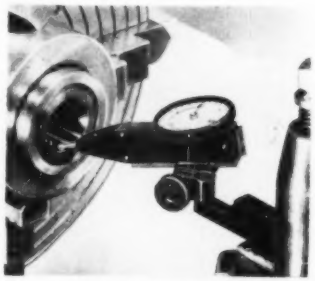
In addition to the regular style, indicators can be had in the perpendicular spindle type, in which the movement of the contact point is at right angles to the dial. These have a different interior mechanism, employing a rack and pinion and a crown gear, but are equally accurate and sensitive. The stem projects from the back of the case, and a mounting rod is screwed into the bottom in the position normally occupied by the stem of a standard indicator.

Another type is the supersensitive model. These have a very short range, usually about 0.008 in., and are graduated in either 0.00005 or 0.0001 in. In these, all internal friction, inertia, and loss of motion has been reduced to a minimum. Despite their high sensitivity, these instruments are as well suited for production as for laboratory work.

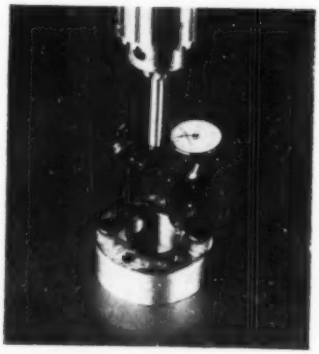
Universal Test Indicator

Also available, and in very common use, is the universal test indicator. This is a tiny instrument, little larger than the human thumb, and may be had with the dial reading vertically or horizontally. The index point projects from the end of a small rectangular housing, where it is pivoted in tiny jeweled bearings. A lever arm attached to the point carries a gear quadrant which, by means of a pinion and crown gear, transmits the motion to a pointer. As in a standard indicator, the dial may be turned for zero setting, but in addition, the index point may be set at any desired angle in a 180° arc and may be made to operate on either upward or downward pressure on the index point.

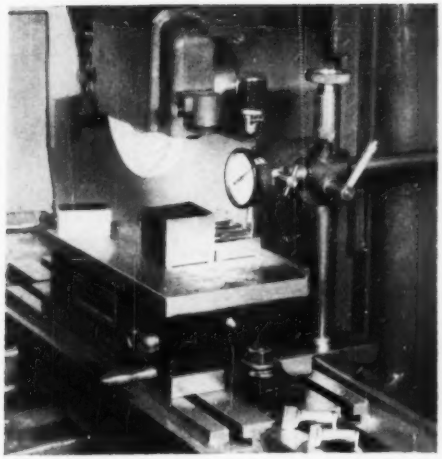
Because of the simplicity of mounting without special adapters, and the fact that they can be turned in all directions test indicators are widely used on height gages for inspection and layout work, in lathe toolposts, boring-mill spindles, and in many places where maximum accuracy is required in limited space.



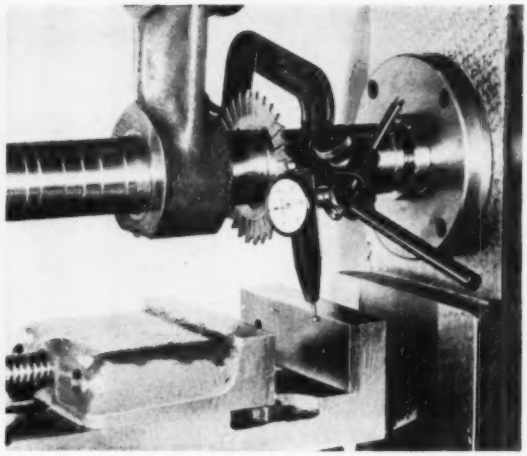
Universal test indicator is equally at home in the tool post of a lathe or on the column of a height gage. Small, light, and highly sensitive, this type has wide machine shop application



Jig borers and similar vertical-spindle machines can make effective use of a perpendicular type test indicator which can be read without stooping



Inspection of parts before removal from the machine by mounting an indicator on a surface grinder bed insures accurate work regardless of wheel wear



Parallelism of vise jaws is readily checked by attaching an indicator to a milling machine spindle with a suitable clamp and traversing the table

Maintenance and Checking

WITH normal operation, a dial indicator requires little or no maintenance. At long intervals a minute quantity of light instrument oil may be needed on the spindle, gear teeth, and bearings, but this operation should be performed by an instrument maker. Too much, or the wrong kind of oil, will seriously disturb the accuracy and sensitivity. If the instrument does develop errors, it is good policy to return it to the manufacturer for repairs. The cost is small and the job is guaranteed. An amateur, digging around with a pair of pliers and a screwdriver, can easily damage the works beyond repair.

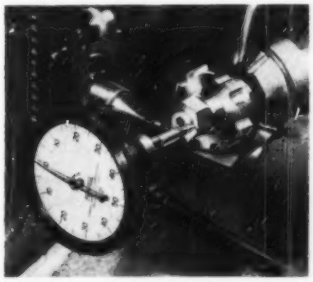
It is not good practice to drill the back or case, whether for some special mounting or any other reason. The small chips may get between the gear teeth and either jam the instrument or cause erratic readings. If for some reason the case must be drilled, the mechanism should be removed and the case carefully cleaned before the inside is replaced.

Many misconceptions exist as to how an indicator should be checked. The most common is to see whether the pointer returns to its original position after pushing up the contact point and letting it drop back. Such a test is completely useless, as manufacturers make no attempt to have the pointer return to exactly the same spot. However, if the indicator is solidly mounted over a level surface plate, and a Johansson block or other master is passed under the index point, the pointer will come to exactly the same place on the dial every time if the instrument is in proper order. All surfaces involved must, of course, be scrupulously clean when this test is made, as even tiny bits of dirt will make a difference in the reading.

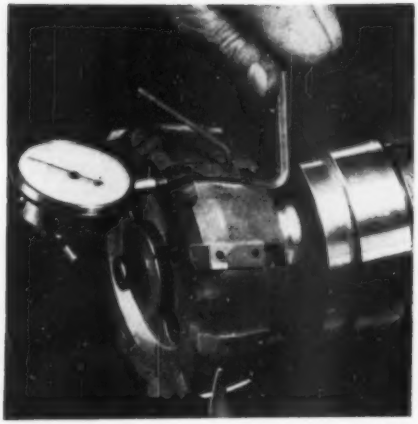
This ability to "repeat" is one mark of a good indicator, and failure to repeat is one of the most common causes of complaint. Investigation of such complaints, however, usually reveals that unless the instrument has been abused or is actually worn, tests are being made over an irregular or dirty working surface.

Over-sensitivity may also be a cause of apparent failure to repeat. If a 0.0001-in. indicator is being used to check work with a rough surface, or if the work is being held to somewhat coarse limits, the difference between a number of parts may appear to be substantial even though they are within the limits set. In such cases, the operator is prone to claim that the indicator is inaccurate and is failing to repeat. The remedy, of course, is to use a less-sensitive indicator on less accurate work.

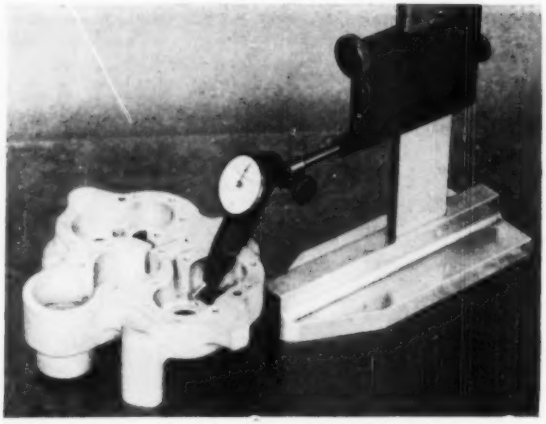
As with any precision instrument, it is necessary that dial indicators be checked from time to time, while in use, with a master to make sure that the setting has not changed or that wear is not causing the reading to change.



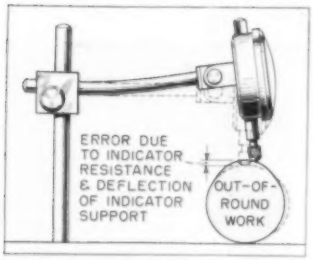
Perpendicular-spindle indicators have the spindle projecting from the back of the case. For certain special applications they may be more convenient to read



Milling cutter teeth adjusted to an indicator are assured of exact positioning, resulting in greatly increased cutter life, better finish on the work, and increased machine efficiency



Depth measurement is readily checked to close limits by mounting an indicator on a height gage. For the boring operation the indicator can be clamped to the spindle quill with the contact point resting on the fixed bearing cap or other part of the machine



Accurate results cannot be obtained unless the instrument is mounted on a solid support which will not deflect under the weight of the indicator or the resistance of the mechanism

Cross-slide movement controlled by mounting an indicator on the slide and using a simple adjustable stop on the carriage. Setup shown is poor because stop support is too flimsy. Angle iron would be more rigid

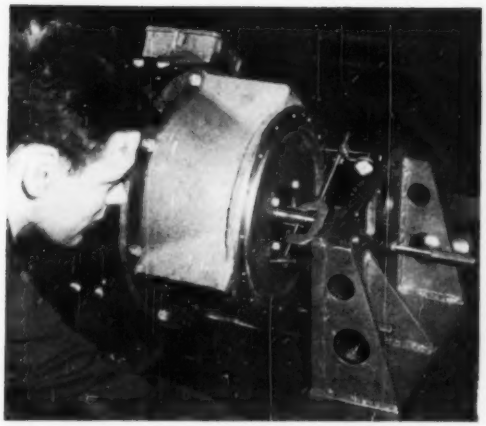
When inspecting a large quantity of work it is common practice to set up an indicator as a master check and, at intervals, a piece that has been passed by the working gage is rechecked with the master. This serves to determine whether the working gages are holding size, and when subsequent inspections reveal errors in the work, the master indicator is condemned as inaccurate. Actually, the fault lies with a failure to realize that the master gage is also subject to some wear and change in setting and should be checked and reset at intervals. This is, of course, normal practice in any type of gaging.

Mounting the Indicator

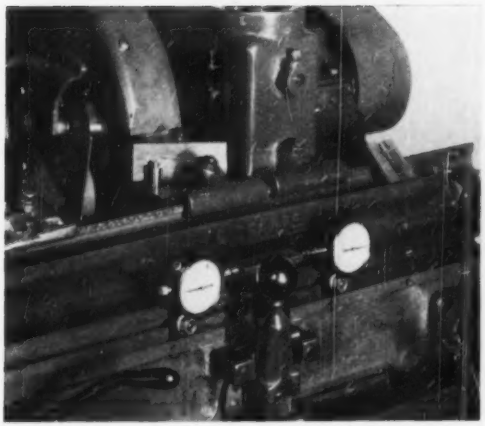
CORRECT MOUNTING is perhaps the most important item in setting up a dial indicator. The more sensitive the instrument, the more rigid must be the mount, and most complaints of inaccurate operation can be traced to flimsy or jury-rig mounting. A gage carried on the end of a long slender rod cannot be expected to repeat accurately, as there is bound to be some deflection in the rod. The condition is aggravated, of course, if there is vibration present.

For best results, the indicator should be positioned as close as possible to a rigid support, otherwise the mounting rod may deflect before the indicator point moves, unless it is a very sensitive one. This is particularly true in measuring eccentricity, where the change is gradual. The importance of rigidity cannot be over emphasized, and applies whether the instrument is mounted on a rod or is built in as part of a more complicated gage. Whatever type of mount is used, however, it should be attached to the back of the case. Clamping around the stem is definitely bad practice, except when properly done, as it may squeeze the spindle and destroy the sensitivity of the instrument.

When indicators are built in as part of a gage, care must be taken to see that there is no lost motion between the contact point of the indicator and the member which actually touches the work. As a rule it is better to have the indicator point make the contact, but if this is not possible the transfer mechanism should be light, to avoid inertia, and should be designed to eliminate friction and lost motion. Points should be



Inspection setup uses a dial indicator to check exact relationship between flange, rabbet and shaft on gearmotor housing. Relation of holes in the angles at the end brackets is also checked to insure precise mating at assembly



Accurate positioning of grinder table when dressing wheel radius is insured by indicator at left bearing against a special stop. Indicator at right positions the table for contour grinding of work after dressing

shielded so rough or careless insertion of the work into the gage will not damage them or push them up beyond the range of the instrument. If contact must be made on a curved or angular surface, it is better to use auxiliary contacts to avoid side pressure on the spindle.

It is always important that all workpieces be applied to the gage in the same manner. Variations in handling can cause variations and distortions of the gage setup with resultant reading errors.

Advantages Produced

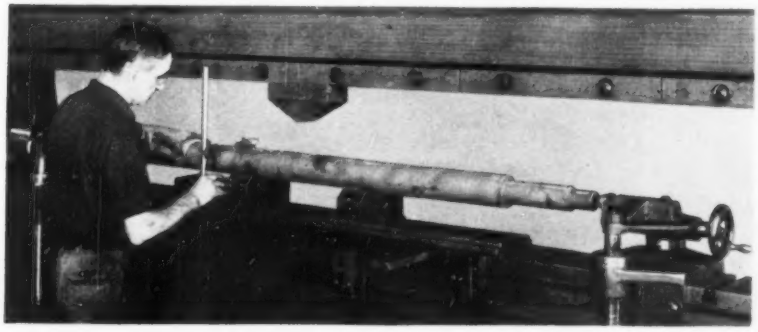
The first particular advantage the dial indicator enjoys over most other measuring instruments is that it eliminates the human variable caused by feel, and substitutes the universal standard of sight. Any number of users can thus obtain identical readings on the same dimension without the benefit of experience or the exercise of judgment on the part of the operator.

Of equal importance is the ability of the user to know not only whether the dimension is right or wrong, but by how much it is wrong. By this added information he can segregate oversize pieces for selective use or rework. Moreover, with the increase in the application of statistical quality control, the graduations of a dial indicator furnish the necessary means for obtaining the data required. By its use trends in production changes due to tool wear and machine adjustment are quickly identified and corrected.

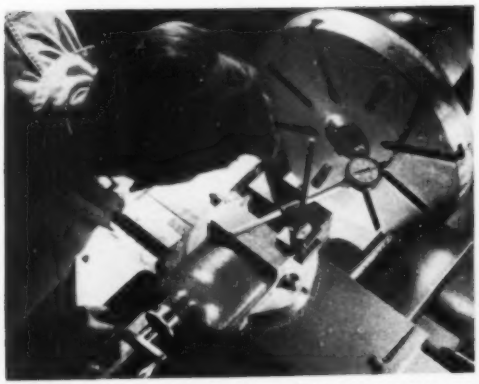
For example: If five pieces are taken as they come off the machine, the operator using conventional fixed gages can determine only whether their dimensions are right or wrong, whereas inspection of these pieces with a dial indicator may show that they are becoming progressively larger and that the tool is wearing or the machine getting out of proper adjustment.

Still another advantage is the greater speed at which work can be inspected. With multiple-dimension gages, several indicators can inspect as many dimensions simultaneously and in proper relation to each other.

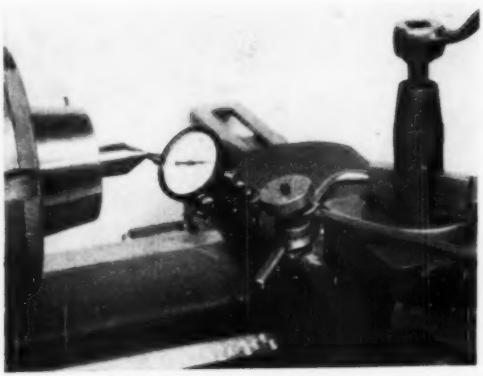
Hence, any operation that can be performed with conventional gages can usually be performed quicker and better with dial indicators.



Straightening long shafts in a press brake is simplified when a dial indicator is used to check the high spots and determine where pressure should be applied. This is a great improvement over the old chalkline method



Faceplate runout is tested with an indicator, but this is a poor setup because the instrument is not square with the face and there is some side thrust on the spindle which may cause minor inaccuracies



Accuracy of a lathe headstock center is easily checked by mounting an indicator in the tool post. Fluctuation of the pointer, when the spindle is running, shows when and how much center is out of line

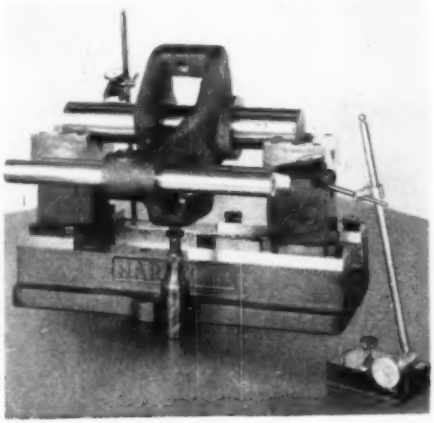
When and How to Use Indicators

PERHAPS the commonest misconception regarding indicators is that they are applicable to only the most exacting measurements. Actually, they can be used equally effectively whether the dimensions are expressed in hundredths of an inch or in tenths of thousandths. The dial makes visible instantly and positively, any deviation from a predetermined zero point, and indicates this in magnified form.

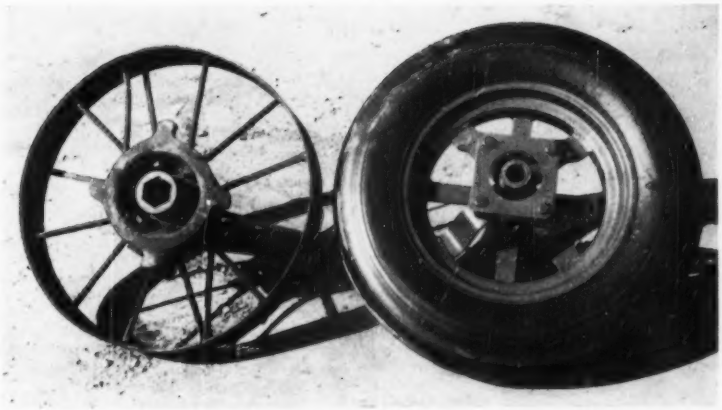
Because each indicator is a self-contained measuring instrument, it is entirely practicable, and indeed, very common practice, to arrange a group of them for simultaneous checking of several dimensions. This is an important time saver when done correctly, but it must be appreciated that multiple diameters on a workpiece are not necessarily concentric. Hence, in multiple gaging, it is necessary to provide means whereby each diameter can be inspected independently of other diameters. For example, if a workpiece having three diameters is supported in a V-block and rotated under three indicators, any eccentricity will show up immediately, but diameters cannot be checked in this way because the V-block is being used as a reference point. To check the diameters, a separate reference point must be provided for each diameter, and the V-block will act merely as a work support.

The size of an indicator is no measure of its accuracy; different standard diameter bodies are provided to suit the user's preferences or the space available for installation. There is, however, a certain psychological advantage in using the smaller size for the more exact work. Not that the dial requires closer attention but there is something about the small size that seems to imply precision. There is no logic in such a choice, but it is akin to that of a bookkeeper who finds that a fine pointed pen leads to greater accuracy in his figuring.

Many machinists will check a finish turned or ground part with an indicator when dealing in thousandths, but would not dream of using it for checking the rough stock. Actually he could save time and do a better job by so doing. It is true that the dial indicator is a precision instrument, but it is intended to be used, not kept in the tool box and brought out only on special occasions. Given a chance, it will pay for itself in short order and will continue to produce worthwhile savings for many years.



Inspection of a machined casting for parallelism of bored holes and milled faces, and accuracy of hole spacing is simplified by use of a V-block fixture and two indicators

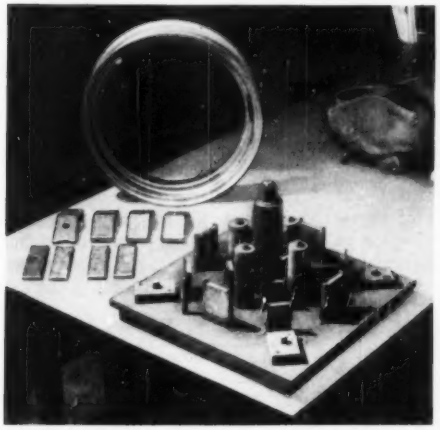


Comparison between new welded wheel, right, and old wheel with cast-iron hub and bolted spokes. Old design is not only obsolete for farm equipment, but manufacturing costs are too high

How to Weld a Wheel

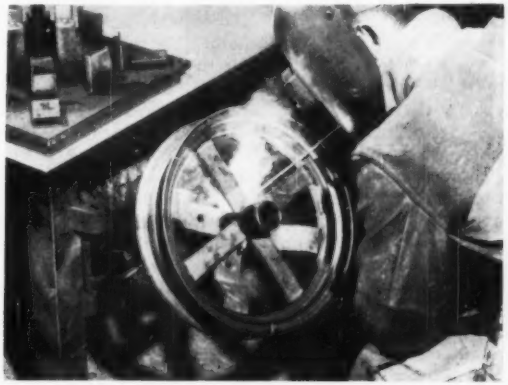
Redesigning for welded fabrication is now recognized as one of the best methods of reducing manufacturing costs to meet the rapidly developing buyer's market. The Towner Mfg. Co., Santa Ana, Calif., manufacturer of tillage tools and other soil-breaking implements for the farm, envisaged this condition and has worked out a successful program of redesigning for lower costs and improved performance.

The method of producing a typical wheel is shown in the accompanying illustrations. The rolled rim is purchased, but all other parts are made from mild steel. Dependency on an outside supplier for hub castings is eliminated, as well as the cost of storage and design changes in patterns. The result is a better wheel at lower material and labor costs.

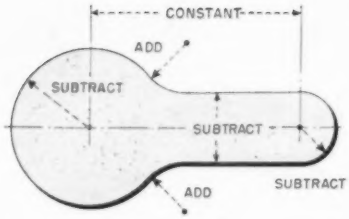


Welded wheel components and welding fixture. Spokes are sheared from mild steel and formed. Tubular hub is on expanding mandrel in center of fixture

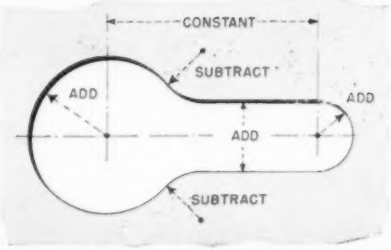
Assembled parts are tack welded together in the fixture, using Lincoln Electric Fleetweld No. 7 electrode of E6012 class because of non-uniform fitup of spokes



Final welding is done on a simple, inclined post which permits turning the wheel so all joints can be made downhand. The same type electrode is used as for tackwelding



1 When clearance is applied to punch: Subtract clearance from all radiuses with centers inside punch. Add clearance to all radiuses with centers outside. Subtract from all dimensions between parallel lines. Angles and dimensions between centers remain constant



2 When clearance is applied to die: Add clearance to all radiuses with centers inside die. Subtract clearance from all radiuses with centers outside. Add to all dimensions between parallel lines. Angles and dimensions between centers remain constant

It's Easy to Calculate DIE CLEARANCES

Two simple rules and two tables of constants enable the designer to make correct allowances on piercing and blanking dies

BY J. R. PAQUIN
Worcester, Mass.

APPLICATION of the proper clearances to cutting dies need not be a difficult task if the principles underlying the process are clearly understood, and if the correct formulas and tables are available.

For a blank to part cleanly from the material strip, there must be exactly the correct space between the edge of the punch and the cutting edge of the die. If too little clearance exists, power consumption to operate the press will be excessive. Also, when the punch enters the material strip, the fractures which originate from both sides of the stock—punch side and die side—will not meet, and a ragged edge will be formed on the blank, or on the inside edge of the hole being pierced.

Excessive clearance will dish the blank and produce long, stringy burrs all around the edge. Application of the correct clearance will result in the blank free of burrs, and with the burnished portion of its edge extending to the greatest possible depth. This burnished part of the edge should be approximately one-third of the blank thickness.

The proper clearance to apply depends upon the material, its degree of hardness, and its thickness.

An accompanying table gives the formula and table of constants by which clearances may be quickly and accurately calculated. The values arrived at by the use of this table and formula apply to overall clearances or diameters. When clearance "on a side" is desired, as when laying out dies of an irregular shape or for cutting out only portions of a blank, divide the answer arrived at by two. This is the value which would be applied to the radiuses in Fig. 1 and 2.

For example, if 16-gage (0.0625-in.) hard steel is to be punched in the die, look under Hard Steel in the table, and the constant 14 is given. Therefore, divide 0.0625 by 14, and the answer, 0.0045 in., is applied either to the punch or to the die hole.

The application of clearance to dies of irregular shape presents some problems as, under certain conditions, the clearance must be added to the required dimension while at other times it must be subtracted from it. Fig. 1 and 2

Constants for Various Materials

Formula: Thickness of Stock / Given Constant

MATERIAL	CONSTANT
Copper	21
Brass	20
Soft Steel	17
Medium Steel	16
Phosphor Bronze	16
Hard Steel	14
Boiler Plate (over ¼ in. thick)	10
Soft and Medium Steel (over ¼ in. thick)	10
Aluminum (to ⅛ in. thick)	10
Aluminum (over ⅛ in. thick)	8

PUNCH OR DIE ALLOWANCE TO COMPENSATE FOR PART SIZE CHANGE

STOCK, THICKNESS, GAGE	ALLOWANCE IN.
50 to 22	0.001
22 to 16	0.0015
16 to 10	0.002

give clear rules to follow in applying clearances, either to the punch or to the die.

It must be remembered that the clearance must be applied to either the punch or the die; never to both. The rule to follow in determining whether the clearance must be applied to the punch or to the die is: Where a slug is being produced, which will be thrown away as scrap, the punch must be to size, and the clearance is applied to the die. Where a blank is being produced, which will be kept, and the strip from which it is removed will be thrown away as scrap, the die opening is made to size, and the clearance is applied to the punch.

Secondary Allowances

However, after being punched out, holes close in a certain amount if they are under 1-in. dia. Blanks under 1-in. dia. have the reverse tendency of swelling. A second table lists the amount to add either to the punch, or subtract from the die, to compensate for this, so an accurate piece will be produced. Holes or blanks greater than 1-in. dia will not possess this characteristic, and no allowance need be given.

When the blank is required, the allowance must be subtracted from the diameter of the die hole. When accurate piercing is desired, the allowance must be added to the punch diameter. When punches and dies are of irregular shape, one-half the given figure must be either added or subtracted all around.

The matter of correct allowances on punches and dies has long been a source of trouble, and improper allowances have been responsible for much spoiled work and, in some cases, for broken tools or even for seriously damaged presses. However, if the outlined procedure is carefully followed, no trouble should be experienced by the die designer in applying the correct clearances to any cutting die he might be called upon to originate. The data given have been used in practice, and found to fulfill all the requirements of power economy, satisfactory cutting action, clean blanks, and long life for the cutting edges of the dies.

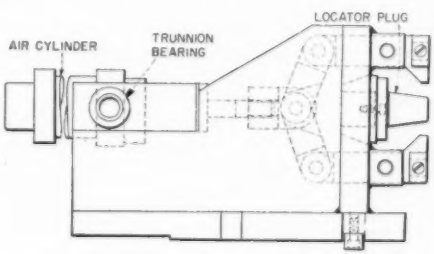
Gears are loaded alternately on two locator plugs and are clamped by independently operated air cylinders. Clamping jaws are off center 3/16 in. (toward the middle of the fixture) to clear the bevel sections of the blanks

Alternating Milling Setup Turns Out Gear Blanks Continuously

BY PAUL BLUDAU, Tractor Works, Allis-Chalmers Mfg. Co.

ONLY half-gears are necessary for tractor steering mechanisms, so a double setup on a Milwaukee miller permits side-feed carbide milling to provide operating clearance in gear-blank castings. Gears are clamped on locator plugs at either end of the air-powered fixture while the cutter is finishing another blank at the opposite end of the table.

Setups are made with the segments, which are later cut to tooth profiles, facing out. Independent action of the air-cylinder clamps, and automatic reciprocation of the table by means of stops, permits the operator to load and unload at one end while the machining is progressing at the other end. The four-tooth cutter operates at 705 rpm and table feed is 10 ipm. Hannifin double-acting cylinders actuate the clamps. A finished blank is removed after each stroke of the table.



Locator plugs are interchangeable for four different gears. Each set of clamps is connected by toggle links with a clevis block on the piston rod of a cylinder. Air-pressure regulation in the line insures even clamping pressure. Trunnion-bearing support of the cylinders prevents binding under pressure

Ring-gear station is in position for broaching radiused slot in bore of large steel gear. Five-station fixture can be indexed to any of four other stations for broaching other tractor parts. Operator is checking ring-gear location with gear-tooth locator block at top of fixure. Block is slotted so it can be brought against teeth of ring gear. Each slot broached in bore must be under crest of a gear tooth

Segment-bevel-gear station is now in broaching position and ring-gear station is at lower right. Operator is clamping segment bevel gear after spline broach has been inserted. Gear-tooth locator is carried on spring-loaded plunger rod, and cam clamp is slotted to permit withdrawal when changing pieces. Broach guide-bushing has soft bore for protection of broach teeth

BROACHING FIXTURE ACCOMMODATES SIX DIFFERENT PARTS

Indexing feature speeds change-over from one job to another

BY ELMER NEUMAN,
WEST ALLIS TRACTOR WORKS
ALLIS-CHALMERS MFG. CO.

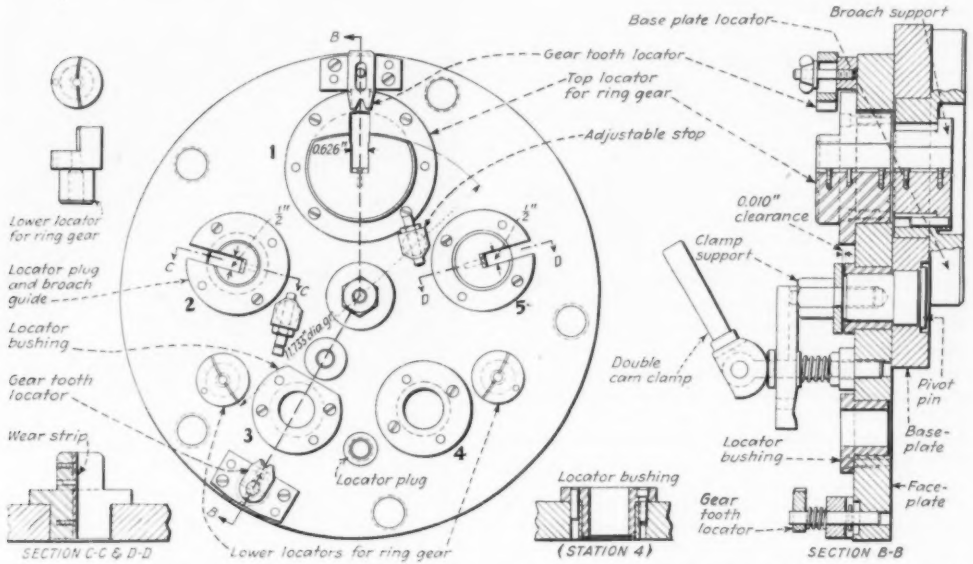
SETUP TIME for broaching any of six tractor parts on a 15-ton horizontal broaching machine at the West Allis Tractor Works has been reduced to a minimum by a novel fixture with permanent locator stations mounted on an indexing faceplate. Each part fits a given station and each station quickly may be indexed to the broaching position. Conventional keyway and internal spline broaches are used.

At station 1, three equally spaced slots, 5/32-in. radius, are broached in the bore of a 14.032- to 14.037-in. OD ring gear. A stepped locator at station 1 and two smaller locators, mounted 120° to each side of the main locator, hold the part. After one slot is broached, the gear is turned 120° for the next slot. Each of the lower locators has a 0.3125-in. hole so a 0.3120-in. dia pin can be inserted into the broached slot and the locator to position the gear for the second and third slots. Steps on all three locators are ground to 11.733-in. dia for a snug fit in the 11.746-11.747-in. bore of the ring gear. Slots are broached to scale size within ±1/64 in. from one setup to the next. These slots are reamed to finished size in assembly.

Steering worm gears of forged steel are keyway broached at stations 2 and 5. Two different gears with 1.730-in. dia bores can be located on the extension plug at station 2, while the plug at station 5 is ground for a snug fit in the 2.230-in. dia bore of the third steering worm gear. Each of these stations has a 0.125-in. thick hardened and ground steel shim or wear strip in the bottom of the broach guide-slot to minimize wear. At station 1, in addition to a wear strip, a 0.250-in. thick auxiliary shim is under the broach cutter.

Stations 3 and 4 are for broaching splines in the bores of two segment bevel gears for the steering mechanisms of Allis-Chalmers tractors. At station 3, a spring-loaded locator holds the center tooth on the gear in accurate alignment with the splines to be broached in the bore. This accomplished at stations 2 and 5 with adjustable stops that locate against ends of segments of the steering worm gears. At station 3 a cam clamp holds the segment bevel gear against the broach guide-bushing while the broach is inserted into the puller. Broach guide-bushings at stations 3 and 4 have soft bores to minimize damage to broach teeth if they touch the bushings.

Run-out of faces of bevel gears broached in this fixture easily is held within 0.002 in. Tolerances for keyway location and spline location range from +0.001, −0.000 to +0.000, −0.001 in.



Five-station fixture has indexing faceplate 17½ in. in dia, 1⅜ in. thick. Faceplate is supported on 1¾-in.-dia pivot pin extending from 12x12⅜-in. steel baseplate that is attached to faceplate of broaching machine with four ½-in. capscrews. On rear face of baseplate is bolted 10-in.-dia, 1¼-in. thick steel locator plug, turned and ground for snug fit in bore of machine faceplate. Fixture faceplate is held in angular location with Universal index plunger that fits hardened steel index bushings carried in faceplate at proper position to locate any one of five stations central with broach support assembly mounted in baseplate. Locator plugs are ground for snug fit on work

NEW COLOR CODE FOR STEEL BAR STOCK

THE COLOR code chart now issued by the National Screw Machine Products Association, 13210 Shaker Square, Cleveland 20, Ohio, supersedes the temporary chart released in June, 1948. The new code represents the most practical combination of bar numbers and color types as used by the screw-machine products industry, steel mills and warehouses. Universal use of this code by steel suppliers depends on the frequency of requests from bar-stock consumers in industry.

Thus, by specifying this code for orders, the consumer can eliminate color confusion in his plant and be instrumental in standardizing this code for the industry. If sufficient interest is indicated, the Association will prepare oil-resistant charts about 14x18 in. with metal eyelets for 50¢ each.

COLOR CODE FOR STEEL BARS

Steel	*Color Marking*
B1112	Green
B1113	Orange
C1019	Yellow
C1020	White
C1117	Aluminum
C1118	Red
C1137	Gold

How to Choose and Use PORTABLE TOOLS

PART 3 . . .
SELECTING THE RIGHT TOOL

Successful, money-saving application of portable tools depends to a large extent upon the selection of the right model tool for the job

BY H. P. BAILEY, President ROTOR TOOL CO.

INDIVIDUAL portable tools are designed to provide a given horsepower at a given load speed, with a minimum of weight. Unfortunately, from the viewpoint of efficiency for a given job, there may be three or four different tools which will do the work, although one of them will do it far better than the others. The selection, or application engineering, of the right tool, particularly on those jobs which are repeated continually, is therefore a matter of considerable importance. The original cost of the different tools which might be used is just about the same, but the resulting output may easily be increased 10, 20 or even 50% by a simple switch to the right tool for the job.

In this article, attention will be centered on the different types of tools for the individual job without regard to the form of power supply used for the tool since, in general, the different types of tools considered are available with all forms of power supply. Portable tools, for example, may be powered by universal electric current which is available in the plant; or by compressed air from a compressor power-supply unit. 180 and 360-cycle electric tools may be powered by suitable induction converters.

In analyzing the work to be done, the starting point is consideration of the different tools with different accessories which might be fitted to the job, then the selection of the cutting accessory which will remove the most metal with the proper finish. It is not the purpose of this article to discuss the general subject of grinding wheels but it is important to state that, for example, there is a great difference in the variety of 6-in. grinding wheels available. With very few exceptions, all such wheels now commonly used on portable tools are of the high-speed type which has been made practicable by the use of rotary grinders and which will operate at higher speeds than the old piston types. However, it will pay the individual foreman to try a variety of wheels on a given 6-in. job,

Substituting a 180-cycle right-angle grinder with a cup wheel for a straight 180-cycle grinder increased wheel life 40%, doubled production and produced a better surface

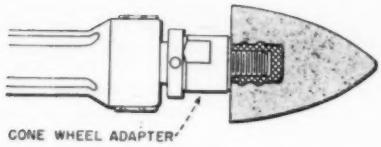
RECOMMENDED MAXIMUM SPEEDS FOR GRINDING WHEELS

Type of Wheels	Vitrified Wheels			Elastic or Organic Bonded Wheels		
	Soft	Medium	Hard	Soft	Medium	Hard
	fpm	fpm	fpm	fpm	fpm	fpm
Type 1 Straight Wheels	5500	6000	6500	6500	8000	9500
Type 6 Cup Wheels	4500	5000	5500	6000	7500	9000

MAXIMUM PERMISSIBLE WHEEL SPEEDS

Type 1 Straight Wheels Inches Dia.	Hard Grade Vitrified Wheels rpm.	Hard Grade Elastic or Organic Bonded Wheels rpm
1¼	21,000	
1½	16,000	24,000
2	12,000	17,000
2½	9,500	14,000
2¾	8,500	13,000
4	6,000	9,000
6	4,100	6,000
8	3,100	4,500
Type 6 Cup Wheels		
6	3,500	5,000

Note: 6-in. hard grade cup wheels may be used at 5500 rpm only where specifically recommended by the manufacturer.



Cone wheel adapter pushes the wheel forward from the end of the machine to give additional clearance. Wheel is screwed against the adapter so it will not come off when machine is idling

keeping track of the time, of metal removed, and comparing it with the wheel cost. With today's high labor rates, it may be said that any wheel which cuts faster than another wheel is justified, even though the life is shorter, because the cost of the wheel per min. is a relatively small item compared to the labor and overhead. This assumes that the right type machine is already on the job.

The important possibilities, however, for increasing output lie in getting just the right tool for the job. To show the importance of this, the examples given are based on actual engineering case histories.

The Right Tool for the Job

Which type of tool is best? A 6-in. straight-type air grinder or a vertical grinder?

A welding department had been using a straight-type 6-in. air grinder to grind off excess weld metal and spatter to make the bottoms of machine bases flat and smooth. The job was changed over to a vertical cup-wheel grinder which has a spindle in vertical relationship to the cup grinding wheel and is held by two handles 90° apart.

Small cone wheel installed on a tool designed for a 6-in. straight wheel will reduce metal removal and increase wheel wear. Correct procedure is to use a higher speed tool

The result in this particular situation was the doubling of output because the flared cup wheel contacted a larger area and made it easier to finish the high spots flush with other metal. At the same time the appearance of the metal was improved because the flat wheel ground smooth and did not dig grooves. The vertical cup-wheel grinder will do much of the work ordinarily done by straight grinders with the advantage that it leaves a flatter, smoother finish than the straight grinder. The cutting action is similar to a surface grinder, cutting down the high spots and leaving a level surface, without removing an excess amount of metal. This machine in general is a money saver for smoothing up castings, cleaning up welds, grinding off high spots, preparing edges of plates for welding, and removal of gates, fins and other obstructions. It may be said that wherever straight grinders are used, 4, 6 or 8 in. dia, a checkup should be made to see if a vertical cup-wheel grinder will do the job better and faster.

The Right Speed for the Job

The free speed of grinding wheels is limited by the safety code which sets up correct safe speeds in surface feet per min. The pamphlet, "Use, Care and Protection of Abrasive Wheels, American Standards Association" gives specific recommendations. These, however, are expressed in fpm., and as the surface speed necessarily varies with the diameter of the wheel, it is advisable to translate these recommendations into rpm. for practical shop application. The accompanying Table* shows maximum permissible speeds for vitrified and elastic bonded wheels in the different sizes commonly used on portable tools. Under no circumstances should wheels be permitted to rotate at higher speeds than those shown.

It is highly important to follow these safety recommendations, as accidents occurring where these recommendations are violated often render the manufacturer liable to common lawsuits. However, it is also important to operate the wheels at the maximum speed allowable under the safety code. This gives the maximum production built into the wheels, improves the metal removing ability, and often prolongs the life of the wheel per ounce of metal removed.

Relatively minor differences in speed often accomplish rather interesting results. As a case in point, cored holes in blower castings were cleaned with 2¾-in. vitrified cone wheels in a gray iron foundry. The job was done at 6000 rpm on grinders usually used at 6000 rpm with 6-in. wheels, but the wheel loss was excessive and metal removal was low. A

*Compressed Air Handbook, Copyright, 1947, by Compressed Air and Gas Institute.

Grinding time for dressing the bottom of weldments to remove excess weld metal and spatter was cut in half, and a better appearance was obtained by changing from a straight to a cup-wheel grinder

shift to a machine of essentially the same type but running 8,500 rpm reduced the weight of the tool from 11½ lb to 9 lb and provided very nearly the correct load surface feet per min. This simple change resulted in a higher surface speed of the cone wheel, reduced grinding costs 20%, and at the same time lightened the tool. It was also found that wheel cost was cut 33 1/3% because of the higher wheel speed under load. This situation is prevalent in many portable tool operations.

A cone adapter should always be used with cone wheels. This is a spacer between the wheel collar and the wheel. It screws on the spindle, in the case of air tools, but slips on in the case of high-cycle tools. This spacer gives more clearance for the wheel itself and forms a solid backing for the wheel when it is screwed onto the end of the spindle. This, in turn, insures that the wheel will not slip off the spindle. Cone wheels should always be balanced before use to avoid vibration.

Effect of Higher Power

With some reservations, the amount of metal removed by portable tools is in direct proportion to the power delivered to the cutting accessory, always bearing in mind that the weight must be kept within reasonable limits. When tools become too heavy for easy operation by the operator the production suffers. In general, portable tools of the universal electric type develop 1 hp. under load per 10 to 15 lb of weight, pneumatic tools per 3 to 5 lb, 180-cycle electric per 7 lb, and 360-cycle tools of the abrasive type per 3 to 3½ lb. This broad principle is subject to some reservation, but, in general, wherever more power can be applied to the job more production results.

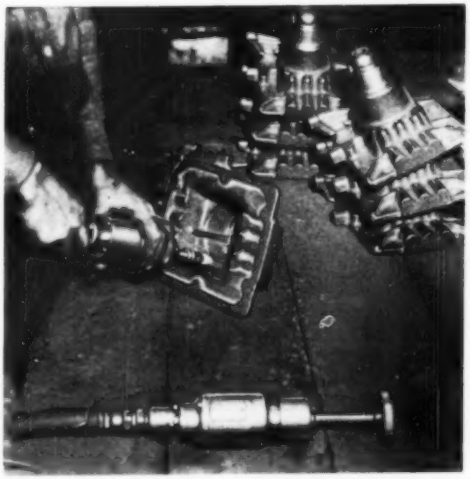
A good example of this is the case of a manufacturer of road construction equipment who was using a 3700-rpm, 6-in. grinder to grind welds flush for mounting parts. The power was inadequate and the surface speed based on 3700 rpm was insufficient.

The job was changed to a 6000-rpm air grinder, with a 6-in. wheel, with results of doubled output which, in turn, cut grinding costs in half. At the same time, working conditions were improved because the air grinder weighed 7 lb less than the former electric grinder, was easier to handle, and cut operator fatigue.

A similar situation became obvious in a foundry using flexible shaft grinders at 9000 rpm with small mounted points for cleaning inside machine tool castings. Production was slow, the speed was obviously too low, and a 20,000-rpm air grinder was put on the job, which gave the right surface speed. Here again production was exactly doubled, fewer jobs were returned for re-cleaning and tool maintenance was cut.

It should be mentioned that while different types of power supply for portable tools generally produce different values per pound of weight, this broad principle must be scrutinized closely, since there is considerable variation in the power per pound developed by different types or kinds of tools, using the same kind of power supply.

In general, changes in types of machines, as mentioned above, apply equally well to changes in types



Mounted points require high operating speeds for maximum production. A 20,000-rpm air grinder replacing a 9000-rpm flexible shaft doubled production on these castings and gave a cleaner job

of 180-cycle tools. In one case, for example, a company was using an 8-in. straight 180-cycle grinder for grinding the bevel edge of plates. The wheel was digging into the metal unevenly, wasting time and material. The job was changed over to a 180-cycle right-angle grinder, which is the equivalent of a vertical cup grinder in the air type, so the high spots were removed easily and speedily, time was cut in half, and wheel life was increased 40%.

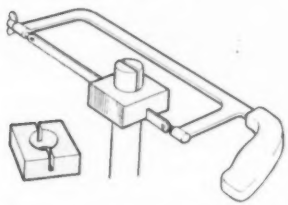
Miscellaneous drilling in the shop often affords unexpected opportunities for savings. In one case, a machinery manufacturer was using slow-speed 15-lb piston-type tools to drill ⅜- to ½-in. holes. He changed to a 1000-rpm, 9-lb rotary type of air drill, and obtained faster, easier drilling which increased production 25%, reduced maintenance and cut fatigue by saving 6 lb in the weight of the tool.

Investigation of the right tool for the job should not be limited to changing one portable tool for another, but should extend to all hand operations. A manufacturer of steel cabinets was using hand spiral screwdrivers to fasten hinges on doors because he had never found a power screwdriver light enough to hold in one hand while the other hand held the door itself. The use of an air screwdriver doubled production. The speed in this particular case was 1000 rpm with the tool containing a double adjustable clutch which drove the screws home with definite uniform tension independent of variations of air pressure or length of time applied. All shock is absorbed by the clutch with no reaction on the operator.

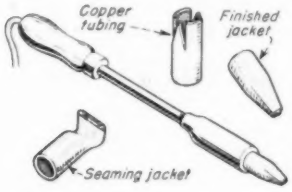
(Part 4 of this series will appear in a forthcoming issue.—Ed.)

Short Cuts FOR THE SMALL SHOP

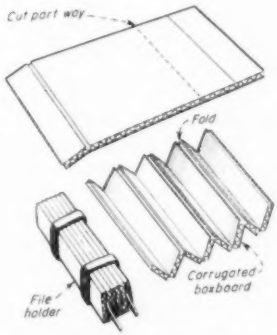
BY A. H. WAYCHOFF



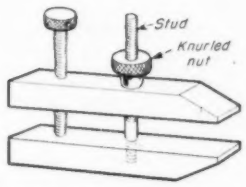
A SAW GUIDE for splitting tubing or solid rounds is often a convenience. To make one, drill a hole through a block of metal or wood to be a snug sliding fit on the work. Make a cross-slot about as deep as the width of the saw blade. Start the cut carefully and then slip the guide onto the blade to keep the latter cutting centrally as sawing proceeds.



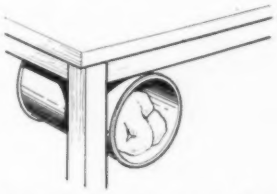
SOLDERING-IRON JACKETS prevent pitting of the tip, can be thrown away when worn. These false tips are quickly made from copper tubing that will fit over the soldering-iron tip, and seemingly do not interfere with heat transfer. One style of jacket is made by notching the end of the tube and folding in the prongs so that they snugly conform to the tip. Another style, which I like better for seaming work than the usual pointed tip, is made by flattening the end of the tube and curling it.



FILE-PROTECTING CASES keep the tools safe from bumping and moisture. Take a piece of corrugated paper box and accordion-pleat it by making parallel knife cuts part-way through the material. Fold up the paper, then spread on the bench partly open. Lay the files in the pleats, push together and slip a rubber band made from an old inner tube over the whole. The paper will take up oil that gets on the files.



CLAMPS with adjusting screws on opposite sides are sometimes bothersome to use, especially in close quarters. For such situations this type of clamp is preferable: Screw a stud into the lower jaw. Drill a clearance hole in the upper jaw. For the second screw, drill and tap the upper jaw. To use, adjust the jaw opening approximately with the rear screw, then tighten the clamp with the knurled nut on the front stud.



SHOP APRONS and cover-alls are often tossed on the bench or into a drawer at quitting time. If one nails a 5-gal. can to the under-side of the bench, it makes a convenient storage place for such items and helps to keep them clean longer.

ROUND TABLE

The Itch to Travel

"Ed, I see Hamilton is back on the bench again. Didn't he quit six months or a year ago? I don't think hiring back a rolling stone is too smart."

"What's wrong with a man taking a powder now and then, Al? I've quit some shops for a year or two and gone back a better man."

"Don't you think, Ed, that when a man leaves, or is fired, that he's likely to be a failure if he's rehired?"

"I do not! In fact, I have a lot of respect for a man who has guts enough to get out and get some varied experience. And the man who was let out for some reason other than plain crookedness or meanness may have learned something before he comes back. The chances are that he would be a good gamble."

"I don't know about that, Ed. I think that once a man quits, he'll never get his old pep back. It's just the same old job, in the same old place."

"For a man who has moved around the country as much as you have, Al, I'd say either you have gone clean off your nut or that you're suffering from advancing age."

"Show me a man in your shop who has quit you and returned that amounts to a darn," challenged Al.

"Take a look down that aisle. See that tall old fellow making the chips fly?"

"Old Jeffers!" puzzled Al. "When did Jeffers ever quit?"

"Ten years ago he came to me and said: 'Ed, I like to work for you and the firm but I'm growing roots sticking around here so long; I'm goin' to to pull out for a change of atmosphere! He was gone for two years."

"Well, he's exceptional."

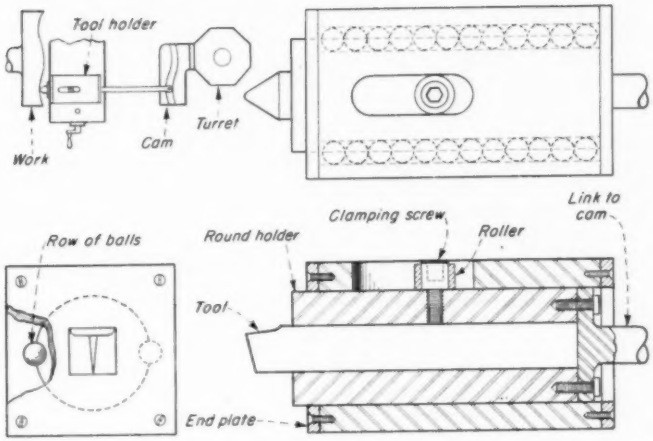
"Potter, the old fellow on the miller there, has been here now for four years after pulling out West for a session—came back with a smile on his face and said to me: 'Ed, you old son of a gun; I've learned my lesson—what say—can I have my old job back?' "

"And you gave it to him! But how many times have you said 'No!'—and how many times have you wished you had? Nope, if a guy quits once, he's likely to quit again—and just when you need him."

"Horsefeathers, Al, most guys settle down after a while."

***IS THE MAN** who has had many jobs likely to keep right on changing? Does the rolling stone ever settle down? If dissatisfaction on either side causes termination, will the rehired man ever get his old cooperative spirit back? Your opinions and experience with rehires will help others. Discussions of earlier topics appear on later pages.*

Practical Ideas



Ball-Supported Toolholder Follows Piston-Head Cam

PROFILES on locomotive piston heads were once turned with a sliding-contact toolholder which followed a cam mounted on the turret of a lathe. An improved toolholder utilizes bearing balls in two rows at the side of the reciprocating holder to reduce friction and wear.

A round holder, split in halves so the square hole could be machined, was turned to slide inside a rectangular block bored to a sliding fit. Bearing grooves in both parts were bored in each side with their centers at the outside edge of the round holder. This meant that more than half the circumference of each ball was inside the bore in the rectangular block, so when the holder was removed, the balls could not fall out.

A socket-head setscrew through the top of the round holder clamped the tool, and a collar-type roller around its head confined the a slot milled in the top of the block. The length of the slot determined the maximum stroke.

Two end plates, bored out to the OD of the holder, kept the balls in place and still permitted movement of the holder. The toolholder was clamped to the cross-slide of the turret lathe and a link to the cam on the turret was bolted to the end of the round holder to transmit longitudinal motion while the cross-feed was engaged. *William Holmes, Glasgow, Scotland.*

Steadyrest Jaws Located Before Stock Is Chucked

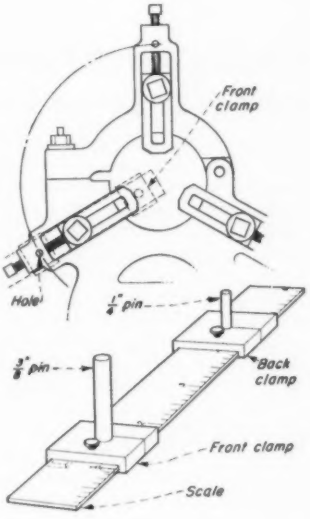
TWO SPECIAL CLAMPS and an ordinary steel scale are all the equipment necessary for pre-locating the jaws of a steadyrest for a given stock diameter. This eliminates a lot of the fussy manipulation usually necessary for centering work that must be held in a rest.

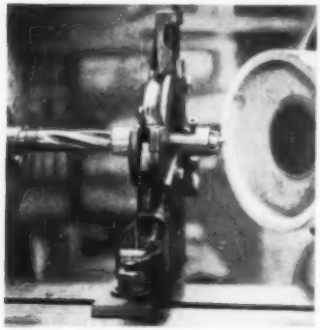
The first step is to move the rest close to the headstock of the lathe. A tool clamped on a faceplate or on the chuck is used to scribe a circle of a convenient radius on the three rest jaws on the sections which are drilled and tapped for the operating screws. Now a ¼-in. hole is drilled in each rest.

The back clamp is adjusted and clamped permanently so the ¼-in. pin fits in one of the drilled holes in a rest arm and the other end of the scale comes exactly to the center of the lathe. This should be done with accuracy, and, once set, will enable accurate settings of the jaws. The front clamp carries a ⅜-in. pin, made from drill rod, which is adjusted for a given size of stock. The distance from the end of the scale to the back edge of the pin is set at the radius of the stock, and the scale is placed on one of the two lower rest arms. Then the jaw is moved up to touch the larger pin and is clamped tight.

This is done for both lower jaws, the stock is chucked, and the top jaw is brought down. If the other settings have been accurate, the top jaw will automatically come to the correct position and the stock will be centered.

A scribed line on the back clamp indicates the center of the ¼-in. pin and the scribed circle on the arm, and a scribed line on the front clamp indicates the back edge of the larger pin. These lines both help in locating the clamps and jaws. *Harold W. Cutting, Lompoc, Cal.*





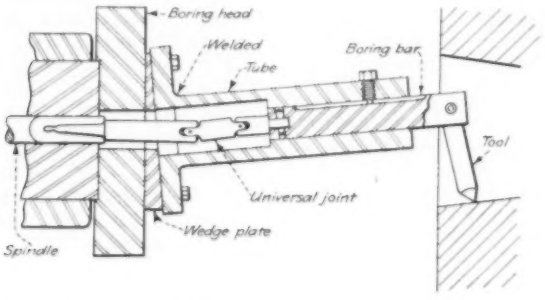
Reverse Centers Locate Reamers For Regrinding Operations

REAMERS lacking centerdrilled holes in their ends are sometimes used in shops where broken reamers are cut off on the ends or where piloted reamers are ground off for conventional operation. These are difficult to regrind without some means of centering them.

We solved this problem by grinding tips on the reamer ends that would fit in centerdrilled holes in a grinding center, thus reversing the usual centering arrangement. Small reamers with an even number of flutes are chucked directly in a four-jaw chuck to form these tips. Small reamers with an odd number of flutes are chucked inside a close-fitting brass or aluminum bushing which has a setscrew located to drive the reamers.

Large reamers can be mounted directly in the spindle nose if the taper is correct. Usually these must be supported near the cutting end to eliminate sway and chatter, so a bushing is made to hold the reamer inside a steadyrest. These bushings are also bored to a close fit, and are tightened on the reamers with setscrews. The rotate inside the steadyrest with the reamers.

This method also requires a tailstock centering spindle which is centerdrilled to the tip angle—90° included—and which replaces the usual spindle. These tips are kept short to keep them from bottoming in drilled holes. In actual practice the tips have not interfered in holes nor have any tips been damaged in holes. *Heinz Landauer, Tampa, Fla.*



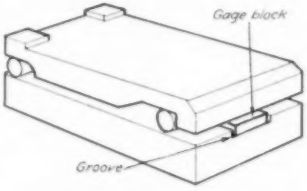
Boring Bar Shifts Diameter To Cut Tapered Bore

PRECISION tapered holes were bored, to avoid costly tapered reamers, with a rig that used a 4-in. G & L boring bar. The holes ranged from 3 to 5 in. in diameter.

The work was set up on a boring-machine table and was drilled conventionally; then the special rig was mounted. The boring head was attached to the spindle with a wedge plate and a long tube welded to another plate. The tube supported the boring bar at the required angle of taper in relation to the axis of the spindle. Drive to the bar was through a universal joint that was operated by an extension of the machine spindle.

The boring bar was keyed to the tubing by means of a screw nesting on a keyway and fixed in the outer tube. With the complete boring head revolving, the tool was fed through the hole by advancing the center spindle. A reverse setup is equally feasible, with the wedge set so the tool would advance and move out to increase the diameter cut as the spindle is advanced.

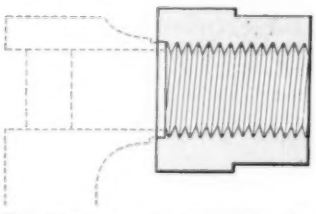
The same setup allowed cutting pipe threads on any job with a correctly ground toolbit. *Fred H. Lingenfelder, Milwaukee, Wis.*



Grooved Sine Plate Mounts Standard Gage Blocks

ANOTHER FEATURE that could be added to Allan B Nixon's heavy sine plate in a recent issue is a 0.100-in.-deep groove through the base of the plate. This would enable the toolmaker to set up minute angles with blocks from a standard set.

If only a few thousandths' rise is necessary, a 0.103, etc. standard block could be employed instead of turning to a feeler gage and shim stock. The width of slot would be determined by the size of the blocks. *Joseph Z Madaras, Fairfield, Conn.*

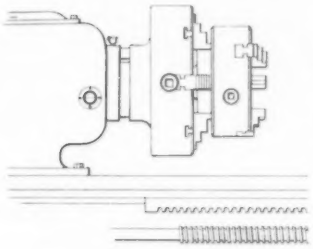


Pipe flanges can be checked for dimensions more easily if the tool is brought back into the work to form a counterbore after the internal thread has been completed. Then measurements in this counterbore can be made as reference for gaging the pipe size when pipes must be cut to fit. *Thomas Watkins, Wilmington, Del.*

Chuck Chucks Chuck To Avoid Hoisting

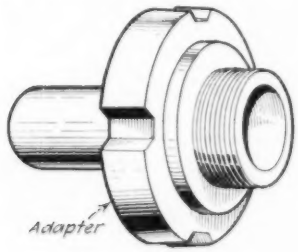
SHOPS that do not have the crane equipment to shift large chucks around when an independent-jaw chuck must be replaced by a universal chuck can employ a special adapter plate which will allow chucking the universal on the independent, provided the universal can be handled without a crane.

The plate is threaded on one side for the universal chuck, and the

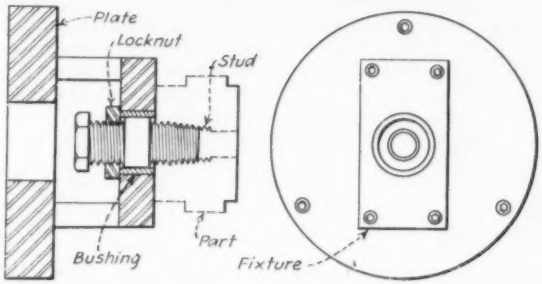


face is machined to match the chuck. On the other side a hollow hub is machined to fit inside the bore of the independent chuck, which should be cleaned with a light cut. The hub should be about 20 thousandths under the bore size to allow for shifting when the plate is clamped.

In order that the independent jaws will not protrude too far when they are clamped, the plate



is machined with four notches to fit the jaws. The surfaces of these are inclined in toward the universal chuck at about 2° so they will tend to force the universal chuck against the front faces of the independent jaws. *Lowell F. Stull, Youngstown, O.*

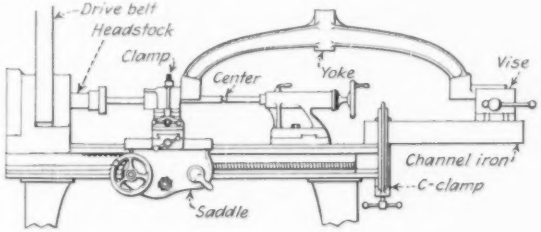


Double-Clamping Fixture Holds Part for Grinding

VARIATIONS in a pipe thread on a part which had to be ground made it necessary to locate the part on a faceplate by means of a finished surface next to the thread. A fixture was devised to hold the part, and while its operation was not fast, it was both accurate and positive.

A plate fixture was added to the faceplate and was drilled on center. A bushing was inserted in the hole and a pipe-threaded stud with a jam nut operating on a second threaded section of the stud was added. The part threaded onto the stud until it was fairly tight, then the lock nut was tightened toward the part until the end of the part bore on the fixture plate.

This location both centered the part and brought it flush to the fixture plate. *Paul H. Winter, Syracuse, N.Y.*

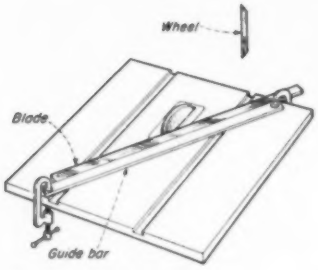


Ancient Lathe Bores Big Work With Bed Extension

AN OLD LATHE was recently fitted up to do a job that was considerably beyond its nominal capacity with a setup that could be applied to many small lathes. The machine was a Barnes "Modelmaker's" lathe, about 60 years old, and was formerly foot powered, although it is now operated by a line shaft and a pulley.

A 3-ft. cement-mixer yoke had to have its sleeve bearings bored out, and although the lathe's capacity was 18-in. stock and a 6-in. swing, the job was done by setting the boring bar up between centers and clamping the yoke stationary. One bearing was gripped on the saddle with a simple clamp, and the other was supported in a small machine vise which was mounted on a 4-in. channel iron C-clamped to the end of the bed. This extension was made extra sturdy.

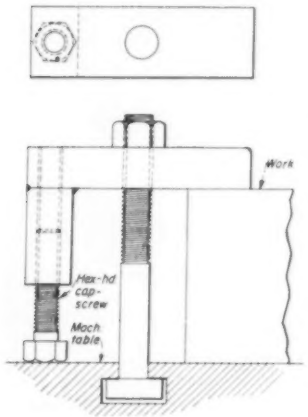
The boring bar was rotated and the sleeve at the front end of the yoke was fed past the tool with hand feed of the saddle. This dragged the vise at the other end along the channel, but because the channel was mounted level and in line with the spindle, this did not affect accuracy. *Carl Peck, Ann Arbor, Mich.*



Shear Blade Ground on Power Table Saw

A 36-IN. BLADE for a squaring shear was sharpened on a power table saw with a tilting arbor. A grinding wheel was mounted on the arbor, dressed to a bevel, and the blade was clamped across the table at the angle of the bevel.

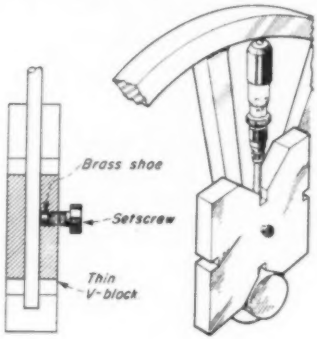
One blade was ground square—or so close to square that the variation made no difference—and another blade was ground with clearance by tilting the arbor. *Bernard Levowich, Brookline, Mass.*



Adjustable Clamps Lock Range of Parts

EASILY MADE CLAMPS are welded together from scrap stock, drilled vertically, and fitted with an adjustable leg by inserting a capscrew through the tapped hole. The vertical leg, if desired, can be made from tapped tubing.

Different-sized clamps and riser blocks are not necessary if the clamps are adjustable through a range of conventional clamping dimensions. Adjustment can be made easily with the clamp already in position on the work. *Roger Isetts, Kenosha, Wis.*



Block Centers Micrometer

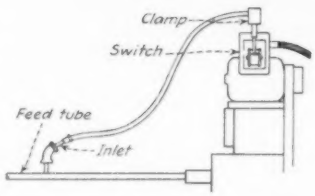
RADIAL MEASUREMENTS are easier to make if a V-block is adapted to support an internal micrometer caliper. This device can be employed for checking such dimensions as from the outside diameter of a shaft to the ID of a gear.

The micrometer and block are locked together by means of a setscrew bearing on a brass shoe which clamps on the gage spindle. This prevents damage to the spindle. Suitable V-blocks for various sizes of shafts can be made from scrap stock. *Charles Shope, Washington, D. C.*

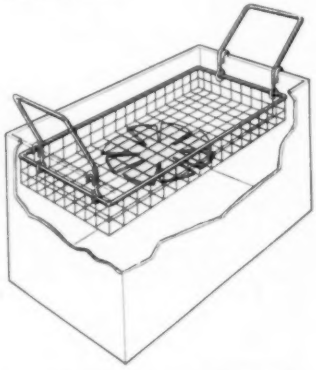
Air-Feed Bypass Shuts Off Nearly-Empty Screw Machine

WE HAVE a small automatic screw machine equipped with air feed which has a counter attached to the chucking mechanism. One trouble we had was that the count would get off when the machine ran out of stock, and stubs would jam in the collet, causing broken drills and reamers.

An eighth-inch hole was drilled in the feed tube at the point where we wanted to stop the plunger automatically so the tube could be reloaded. A line was run from there to a midget air clamp mounted on the switch box over the switch. When the plunger passed the small hole in the tube, air pressure was routed to the clamp, which tripped the motor switch and stopped the machine.



The stopping mechanism works like a charm now, and the count is kept accurate. *R. H. Armacost, Los Angeles, Cal.*

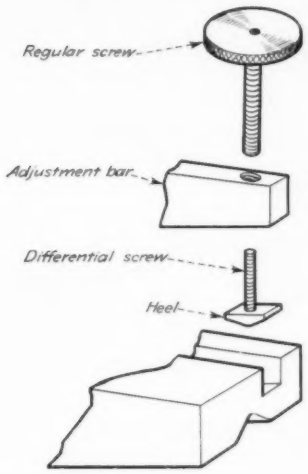


Two Ideas Improve Dip Tanks

PART-CLEANING dip tanks require a lot of elbow grease if the parts must be sloshed by hand; or if a chain hoist is used, the hoist must be reversed a number of times to douse the parts thoroughly.

Here are a couple of ideas that will help out. A circular disk, cut and bent to a windmill shape, is mounted on the bottom of the wire basket which holds parts. When the basket is lowered, the disk circulates the liquid and accelerates the cleaning action.

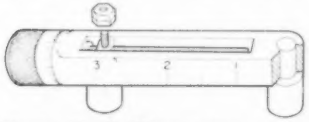
Two small hooks are added to the hinged handles of the basket to allow resting the parts in the tank. These are welded on, and prevent the basket from dropping, and also keep the handles spread out so they can be easily picked up again. *R. B. Wolverhampton, Staffordshire, England.*



Differential Screws Sharpen Surface-Gage Accuracy

THE SENSITIVITY of a surface-gage adjusting screw can be improved by adding a differential screw. This will make minor adjustments of the arm much easier to make, and will improve accuracy.

The regular adjustment on my gage had a 3/16x32 screw, so I drilled this screw and tapped it for a ⅛x40 screw, which I made and assembled into a metal heel. The heel now fits in the gage slot with the small screw threaded inside the regular one. A single turn of the knurled knob moves the lever only 1/160 in. instead of 1/32 in. as before. *Carl S. Frank, Linden, N. J.*

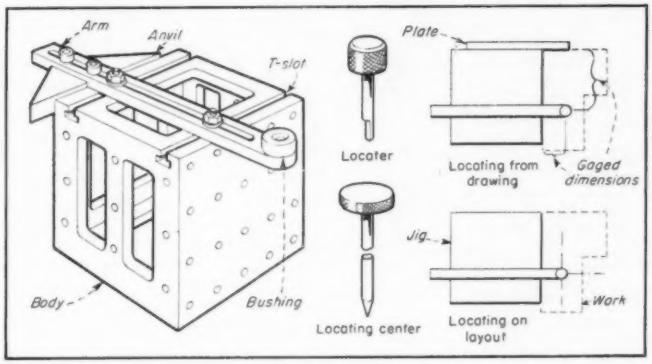


Home-Made Micrometer Checks Inside and Outside

BOTH INSIDE and outside measurements can be taken with a home-made micrometer I constructed with a main bar of ½-in by ⅜-in. steel. The bar was slotted and was drilled and tapped lengthwise for a 40-tpi screw.

Two hardened and ground button studs were made, with one pressed into a vertical hole in the end of the main bar, and the other drilled and tapped with 40 tpi for a precision screw. An index mark on the adjustable stud indicates sizes on a scale along the main bar. The screw operates in a slot in the main bar to move the adjustable stud, and is fitted into the end of the bar and to the barrel.

Rough readings are taken from the long scale, while close readings are checked on the micrometer barrel. Both anvils are ½ in. thick, so inside readings are taken directly from the scales, and outside checks are corrected by subtracting 1 in. from the readings. *Rex Smith, Memphis, Tenn.*



Drilling Jig Improves Accuracy In Working from Layouts, Prints

WE HAVE FOUND a shop-made drill jig to be of great value in aiding precision work, both from layout and directly from blueprints.

The jig body was machined all over with all surfaces square. Two T-slots were cut along its upper face, each near an end of the block, for T-bolts which clamped the jig arm in place. The anvil was slotted to match the arm and was attached to the arm by means of socket-head capscrews and washers to keep the arm exactly perpendicular to the front and back faces of the body. The anvil was adjustable so the arm could be moved out to overhang the body.

Drill bushings to locate in the drilled end of the arm were made for drill sizes up to nearly 1 in., although standard bushings could have been employed. Holes drilled and tapped in the body were for bol ing work, stops and fixture plates to the body, and location was not critical. The milled-out sides provided space for clamping the jig to a machine table and also allowed mounting work partly inside the body so as to reduce unsupported overhang.

A locating center was used for positioning the jig arm above a hole already laid out; its shank was ¼-in. in diameter and it was located in a ¼-in. bushing in the arm. The locater was a ½-in. rod, fitted with a knurled grip and used with a ½-in. bushing, which helped in locating the arm for drilling a hole a specified distance from one of the front corners of the body. The end of the shank was ground off flat to the center to allow gage blocks to be spaced from the face of the block the required distance (from a blueprint) and also from one edge of the block. The distance from the edge was gaged by using a flat plate clamped to that edge and projecting out to the front.

In addition to locating holes on flat surfaces, the jig was employed for holding drill bushings for holes in small parts clamped to the body in many positions. *Allan B. Nixon, Springfield, Mass.*

$25 *In addition to regular payment*

for the best PRACTICAL IDEA

An extra payment of $25 will be made for the best Practical Idea in each number of *American Machinist*. To avoid bias, the selection will be made by readers, a different group each time.

PAYMENT—$25 in addition to regular rates for the item as published, to be paid as soon as reader votes are received—usually three to four weeks after the date of the issue. The winner will also be announced in these pages as soon thereafter as practicable.

JUDGES — A group of 200 *American Machinist* readers is asked to select preferred articles in each issue. The group is a true cross-section of all readers, and changes entirely each time. Their votes, in addition to guiding the editors, select the best Practical Idea. If at any time their votes result in tie, $25 will be paid to each and every co-winner. Decision of the readers will be final in each case.

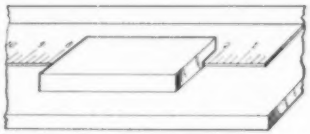
REQUIREMENTS—Only items in the Practical Ideas pages are eligible, and they must be submitted directly by the originator. Do not worry about your shortcomings as a draftsman, photographer or author—every item will be edited in accordance with *American Machinist* standards and suitable illustrative or explanatory material added where needed. Readers will judge only the finished product—in terms of its usefulness to them.

WHO MAY ENTER — Anyone may enter except employees of the McGraw-Hill Publishing Co., Inc., and those of advertising agencies or departments. Suggest to your employees that they submit ideas.

HOW TO ENTER — Send your entry to "Practical Ideas Editor," American Machinist, 330 West 42d St., New York 18, N. Y.

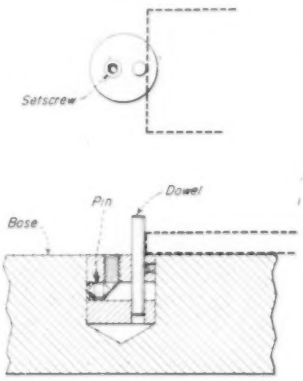
77th Winner:

James Avery
Non-Magnetic
Surface Plate



Stepped Block Aids Layout

HARDENED AND GROUND square and flat on all surfaces, a small block speeds layout work by providing a reference surface for a steel scale. A step in the under side of the block is cut to slightly greater depth than the width of the scale so the scale can easily be slid back and forth under it. A small clearance allows this slip, and also allows tipping the block slightly to clamp the scale in place when dimensions must be marked at the other end of the scale, or in positions where the scale would ordinarily slip out of position. *Howard H. Petre, Carlisle, Iowa.*

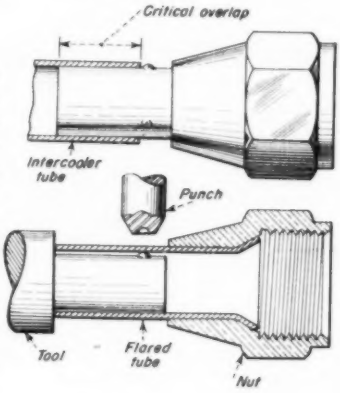


Eccentric Stop Locates Work

ADJUSTABLE STOPS can be made by turning and drilling plugs to fit into holes in jigs and fixtures. The dowel-pin stop is fitted into a vertical hole and is held by a setscrew.

The plug is locked in position by a drill-rod pin, turned at 45° at each end, and pushed out into the side of the plug hole by another setscrew with a 45° coned point.

The eccentric location of the drill-rod pin makes it possible to loosen the coned screw, rotate the plug for correct location of the stop pin, and reset the plug by tightening the coned pin. This type of stop saves on layout time and setup work. *Roger Isetts, Kenosha, Wis.*



Dimpled Tubing Locates Itself for Soldering Job

A METHOD that can be employed for holding parts in certain positions for soldering is demonstrated by an assembly job done on parts that were made for an air-compressor intercooler.

A flared tube had to be inserted in a brass fitting and then pushed into a slightly larger piece of tubing to a set dimension and soldered in place. The critical length of overlap was controlled by dimpling the flared tube in three spots by setting it on a drill-rod tool held in a vise. The hardened tool was formed with a projecting tip that pointed up.

The diameter of the tool was slightly less than that of the tube, and the tool was shouldered so the dimple location was automatic. A recessed rod held in the drillpress chuck was punched down on the tubing, which pressed the tubing down on the point on the tool and formed the dimple. The tube was rotated to form all three dimples.

The operation not only located the assembly, but also locked the nut on the tube, which eliminated fumbling around for two parts during assembly. *Henry George, Dayton, Ohio.*

"Give us the tools..."

YOUR ONLY CHANCE of Getting Ahead

Where is the "brave new world" so glowingly promised us by the politicians during and after the war? We were told then that postwar America would live 50% better than it had before. Why has that promise faded out? Why are men today discouraged and frustrated?

We have not yet made good 1944's promises because the *American worker turns out no more in an hour now than he did in 1941.* We are getting more total production in our country – but only because we have more people working. Not because each one of us is producing more. American industry's ability to turn out more and more goods – with less of each worker's time and effort – has been stymied for eight long years.

Progress has been blocked because in some cases workers have not been willing to work as hard as they did before the war. In other cases unions restrict the use of labor-saving machines and methods. In some places obsolete building codes and ordinances prevent advances. In still other cases progress has been blocked by collusive practices between unions and manufacturers or operators.

But the biggest block to progress is the fact that our industry in the United States has been unable to provide our workers with all the new tools and equipment that they need.

Increasing productivity – that is, each one of us turning out more in each hour of work – is the key to higher living standards. Productivity depends directly upon the kind of tools workers use. His tools, more than anything else, determine how much a worker can turn out; and what his paycheck will buy depends in large part on what he turns out–not on how long or how hard he works.

Look what happened in our country in the forty years from 1900 to 1940. Productivity of the United States *more than doubled.* It doubled because:

Business investment in capital equipment gave workers new tools—tools that had three and one-half times as much power—

So—Americans' living standard rose almost 50% while the average work week was dropping from 61 to 43 hours.

Industry did continue to raise its output per man hour, even in the depressed 1930's. But it did it because, with unemployment widespread, companies used only their most efficient equipment. *Actually the great depression saw industry fall far behind in the job of providing workers with new tools.*

Then came World War II. Few new tools for peacetime industry were produced. *As a result of depression and war, the U.S. fell behind in needed investment in new industrial facilities by more than $100 billion.*

Since the war business has spent almost $60 billion for new plants and equipment –

But the greater part of that money went to *expand* production to take care of the needs of our bigger population, and to *replace* plants and equipment that were worn out and ready to be junked at the end of the war.

continued on next page

Only a small fraction of the $60 billion went to *modernize equipment* – the equipment that increases efficiency and improves productivity of the individual worker.

Right now industry is desperately trying to do the job of increasing efficiency of machines so that each worker can turn out more.

McGraw-Hill's national survey of Business' Needs for New Plants and Equipment shows that manufacturers plan right now to spend in the 5 years ahead three-quarters of their capital funds to replace and modernize facilities. The biggest part of the more than $55 billion industry plans to spend on its plants and equipment will go directly to improve efficiency of the individual.

If industry can carry through its plans – and expand them as it would like to and as it must do – the U. S. can catch up on its depression-war-time lag in progress within a few short years.

If American industry is allowed to earn the money to buy the equipment, it can raise the American standard of living 50% in our generation – in the next 25 years. No other nation can promise its people that much – and deliver on the promise.

But the promise can only be fulfilled by American industry. Wherever you turn, industry has dramatic new ways of doing things. Using oxygen by the ton, steel makers are increasing production from blast furnaces by 20%. New high-speed machine tools are doing three times the work of 1940 tools. A new coal-mining machine will multiply a miner's daily output 10 times. Diesel locomotives do the work of three steam locomotives on many jobs.

New products – and larger production of standard products – are already making their impact on American life. Two million Americans will get new television sets this year. Automatic washing machines, electric dishwashers, and home freezers are easing the daily tasks of thousands of housewives. Millions of homes that did not have them before the war now have telephones, automatic heat and refrigerators. Frozen foods, nylon clothing – these and many other things coming along now – will shape the *real* new world for Americans.

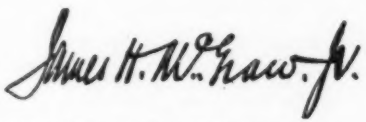
But industry can provide them only if it can keep on investing at least $15 billion a year now – and more in future years – in new plants and equipment.

Today Washington is taking a course which, if pursued, will make that investment by industry impossible. Government spending now strains our resources to the limit, and more multi-billion dollar spending proposals are being piled on. *But government spending cannot improve American living standards.* It never has, and it never will. Increasing government spending *now* will only block progress, because the government proposes to pay for its plans by taxing away the profits industry is using, and must continue to use, to improve and expand its plants and equipment – our only hope for greater worker productivity and higher living standards.

Better living can only be paid for with more production. And we can only get more production by increasing productivity – by each one of us producing more for each hour of work.

The first thing is to get the production – in peace and in war – for better living – for security. Industry is planning to provide it – and is using $13 billion of its profits this year to improve and expand its facilities.

The only sensible, the only safe national policy is to make it possible for American industry to do its job – not to terrorize private industry with proposals of ruinous taxation and paralyzing controls and threats of nationalization. For American industry is not a thing apart from the American people any more than is government. American industry is the lifeblood of the American people and whatever makes industry do its work better contributes more to the common welfare than a bureaucratic government can ever hope to do.



President, McGraw-Hill Publishing Company, Inc.

NEWS OF METALWORKING

11 Machine-Tool Firms Team Up to Boost Exports to Latin America

WASHINGTON—The Export-Import Bank has granted a $3 million revolving credit to a group of 11 machine-tool builders to do business in Latin America under the name of Amertool, Inc. The credit grant will be accepted by Amertool when it is organized as a new corporation under the laws of the State of Ohio on June 16. Headquarters will be in Cincinnati.

Amertool, Inc., will provide engineering service and credit service to machine tool buyers in Latin America. The financing plan under which the new agency will operate is as follows:

1. Each member will sell as an individual company, but sales financed by Amertool must be paid for at least 25% in cash.

2. The remaining 75% will be in notes maturing in two years. Payments against the notes will be in quarterly installments, interest not exceeding 5% a year.

3. The notes will be bought from Amertool at face value by Export-Import Bank or by a commercial bank acting for the Export-Import Bank.

4. To protect against losses to American members and to the Bank, a reserve will be created, in part out of a portion of the initial cash payment received. At the beginning, this reserve will be built up to a minimum figure (for example, to one-third the total of notes outstanding) by mandatory deposits of all cash collections.

Amertool, Inc., will be comprised of these companies: Blanchard Machine Co.; Cincinnati Lathe & Tool Co.; Cincinnati Milling & Grinding Machines, Inc.; Jones & Lamson Machine Co.; Monarch Machine Tool Co.; Fosdick Machine Tool Co.; Heald Machine Co.; Hydraulic Press Mfg. Co.; National Automatic Tool Co.; Cone Automatic Machine Co.; and Thompson Grinder Co.

The credit granted to Amertool, Inc., is only the second of its kind ever made. In October, 1947, a roughly similar deal was worked out with the specially-formed U. S. Scientific Export Association to help finance sales of scientific laboratory equipment. To date, however, no use has been made of the $2.5 million authorized in that case.

Amertool is not a new name in the machine tool export field. It was adopted as the name of a group of non-competitive machine tool companies which started to operate in Czechoslovakia after the war. It later extended its activities into Austria and western Germany. Its membership varies somewhat in each country in which it does business. Amertool, Inc., in its Latin American operations, will not contain exactly the same membership as the Amertool group in Germany. Nelson F. Caldwell, vice president Cincinnati Milling & Grinder Inc., is chairman of the Amertool group working in Europe.

Management Medal Presented

NEW YORK—The American Management Association has awarded the 1948 Gantt Memorial Medal to Fowler McCormick, chairman, International Harvester Co., for "distinguished achievement in industrial management as a service to the community."

British Machinery Dominates Canadian International Fair

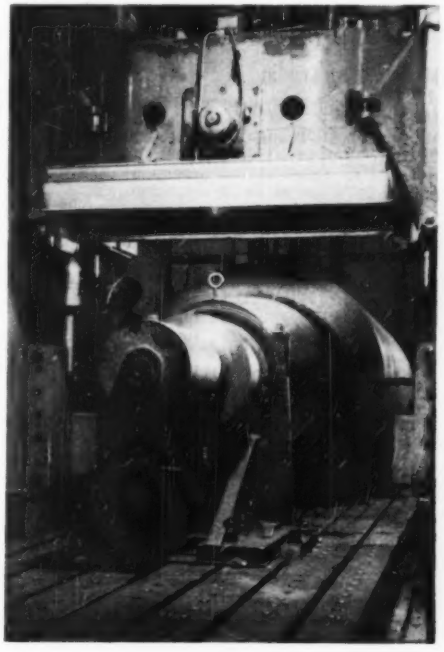
TORONTO—The Canadian International Trade Fair, held here May 30 to June 10, found Great Britain with the heaviest representation of machine tools and machinery from any one country. British products covered a wide range featuring construction equipment and roadbuilding machinery, with some representation in the light and medium machine tool field.

American representation in the machinery group was provided by Balmar Corp., Baltimore; Rapids-Standard Co., Inc., Grand Rapids, Mich.; and the Prime Mover Div. of Bell Aircraft Corp., Buffalo.

European machine tools showed many improvements, all having the American features of quick change gears for thread cutting, and high speed attachments on milling machines for mold production.

NEW PLANER TYPE MILLER

This machine, most powerful in the country, is readied for its first slotting operation in General Electric's new turbine plant. Two 75 hp vertical spindles and two 60 hp side heads provide the drive. A 130,000 lb steel rotor core rests on the 40 ft table. Longitudinal cuts will be made along the 14 ft length of the rotor core. Shafts up to 62 in. diameter may be handled. Infinite control is achieved on the miller by the use of electronic controls. Rate of feed may be varied from ¼ in. to 60 in. One minute is necessary to reverse the table after a cut is completed and bring the core back to its cutting position. The machine weighs 400,000 lb.



AMERICAN GEAR MANUFACTURERS MEET . . .

HOT SPRINGS, Va.—New officers and executive committeemen were elected at the 33rd annual meeting of the American Gear Manufacturers' Association held at The Homestead here June 6-8.

F. W. Walker, executive vice president of the Philadelphia Gear Works, Inc., was elected president; Leroy Brooks, Jr., president of the Tool Steel Gear & Pinion Co., Cincinnati, was elected vice president; and Roger B. Salinger, president of the Massachusetts Gear & Tool Co., Woburn, was re-elected treasurer.

Elected to the executive committee were: Paul W. Christensen, president of Cincinnati Gear Co.; George H. McBride, sales manager of the Nuttal Works, Westinghouse Electric Corp., Pittsburgh; Robert B. Moir, vice president and chief engineer, Foote Bros. Gear & Machine Corp., Chicago; and George H. Sanborn, chief field engineer of the Fellows Gear Shaper Co., Springfield, Vt.

Allan H. Candee of The Gleason Works, Rochester, N. Y., was the 1949 recipient of the Connell Award, given in recognition of his many contributions to the gearing industry's technical knowledge and literature over the past three decades. At various times in his business career, Mr. Candee has been associated with the Allis-Chalmers Mfg. Co., the Johns-Mansville Co., and The Falk Corp. He holds more than 30 patents on methods, machines, and tools for generating gears.

F. W. WALKER
President

LEROY BROOKS, JR.
Vice President

R. B. SALINGER
Treasurer

P. W. CHRISTENSEN
Executive Committee

Steelmaking Studied in Tour of Republic Plants

CLEVELAND—Rivers of steel are flowing endlessly from America's steel plants. This was the impression gained by a group of 30 magazine editors and newspapermen who recently completed a full week's tour of 16 Republic Steel plants.

Starting in Cleveland, the tour presented a comprehensive picture of the entire steelmaking process from ore delivery at the dock to shipping of finished sheet, tinplate, pipe, and fabricated products.

Under the guidance of top management at each plant visited, the group witnessed the operation of blast furnaces, including the new pressure-top types, coke ovens, open hearths, Bessemer converters, and electric furnaces. Blooming, slabbing, rolling sheet, and the manufacture of zinc and tinplated stock were also studied. Fabricating facilities visited included the Berger Mfg. Div., bolt and nut div., steel and tubes div., stainless steel finishing div., Union drawn steel div., Niles steel products, and Truscon Steel Co.

New Equipment for Plastics Industry Described at Annual SPI Conference

CHICAGO — Discussions of sales problems generated by the current buyers' market in virtually all product fields highlighted the annual conference of The Society of The Plastics Industry held at the Edgewater Beach Hotel on May 26 and 27. More than 500 members of SPI from all parts of the United States and Canada attended the two-day sessions.

At the annual business meeting, held during the conference, Horace Gooch, Jr., treasurer of Worcester Moulded Plastics Co., was elected president of the society. He succeeds George H. Clark of The Formica Co., who was elected chairman of the board. Other officers elected were: vice president, J. J. B. Fulenwider of Hercules Powder Co.; secretary, William S. Perry of Franklin Plastics Div., Robinson Industries; treasurer, J. E. Gould, Detroit Macoid Corp. Included among the 15 directors elected to serve for the next year in addition to the officers were: F. W. McIntyre, Sr., Reed-Prentice Corp.; E. R. Perry, Westinghouse Electric Corp.; F. J. Groten, Firestone Plastics Co.; A. W. Hammer, Jr., Durez Plastics & Chemicals, Inc.; Spencer E. Palmer, Tennessee Eastman Corp.; and Felix N. Williams, Monsanto Chemical.

Hyatt Award Presented

The John Wesley Hyatt Award for distinguished achievement in plastics was presented during the conference to Dr. George T. Felbeck, vice president, Carbide and Carbon Chemicals Corporation. Dr. Felbeck received the award for engineering developments leading to the large-scale manufacture of polyethylene resins and plastics for the United States Navy during the recent war. The award was presented by Dr. Gerald Wendt, editorial director of *Science Illustrated*. It is sponsored by Hercules Powder Co. and is named in honor of Hyatt, who developed celluloid, the first thermoplastic, in 1867.

Of particular interest to the production executives attending the conference were three papers describing new equipment developed for the plastics industry. High speed angle type transfer molding presses for compression molding operations were discussed by J. W. Tomka of Elmes Engineering Works, Division of American Steel Foundries.

Louis J. Street of Welding Engineers, Inc., described an unusual machine in which compounding and extruding operations are combined. Large thermoplastic injection molding machines having unusual feeding arrangements were described by James Hendry of Jackson & Church.

Beryllium copper mold components were described by John Press of Federal Tool Corporation, and the problems involved when hobbing mold cavities in alloy steels were discussed by John Sekowski of Midland Die & Engraving Co. Steels commonly used when making mold cavities by hobbing were described by Mr. Sekowski during his talk.

***NEW PRESIDENT** of the Society of the Plastics Industry, Inc., is Horace Gooch, Jr., elected at the annual SPI conference held in Chicago May 26-27. He is treasurer of Worcester Moulded Plastics Co., Worcester, Mass.*

. . . AND ELECT NEW OFFICERS

G. H. McBRIDE
Executive Committee

R. B. MOIR
Executive Committee

G. H. SANBORN
Executive Committee

A. H. CANDEE
Connell Award

Fluid-Controlled Transmission Introduced; Has Only 30 Parts

CLEVELAND — A startling departure in fluid coupling design, the Fluid-Controlled Transmission, was unveiled here by Virgil Stewart and Howard M. Smayda. Stewart, a maintenance supervisor, and Smayda, vice president of Smayda's Home Bakery, worked for two years to complete this new transmission. Stewart had worked on the design independently for 8 years prior to his association with Smayda.

The transmission, which contains less than 30 parts, including bearings and bushings, is expected to cost no more than the conventional manually operated type of transmission. The transmission is completely new in that the fluid coupling controls the changing of ratios of fixed gearing and constant mesh instead of driving the car. This is contrary to popular engineering theory.

Transmission Rotates Freely

The Fluid-Controlled Transmission rotates freely on a shaft having no fixed member within it. When the crankshaft is at 2,000 rpm, the transmission's pump is also at 2,000 rpm but the turbine within revolves in the opposite direction at 1200 rpm, being driven through a gear train. Eventually as power is applied, the pump overrides the turbine and takes it along with it with the ratio gradually changing from the present unit's 4.5:1 to 1:1, or direct drive.

If the load is increased due to hill climbing, accelerating to pass a car, etc., the transmission, through exertion of added pressure against the pump and turbine, will immediately seek a lower ratio to help drive the car. This demonstrates the fact that no freeze-out principle is employed.

With this transmission, greater torque can be delivered when it is needed, and the transmission merely goes along for the ride when it is in direct drive.

The transmission, which Stewart and Smayda installed in a 1940 Ford pick-up truck for their tests, weighs 35 pounds installed. It will be part of the flywheel when installed, and can thus be placed anywhere in the car. This fact would make a rear-engine car practical.

The clutchless transmission system requires installation of a separate gearbox for reverse, and a steering column lever for reverse and neutral positions.

According to Smayda, they can build into the transmission the high ratio of gearing and great torque demanded in the trucking and earth-moving fields merely by changing the gear ratio.

Takes Special Torque Oil

The transmission takes a special torque oil—8 quarts of it—but cost to the car owner will be cut down because the oil has to be changed less often. Further saving is in the fact that the transmission doesn't require adjustment once it is installed because due to the construction of the system, the housing could be welded shut after the transmission has been adjusted and installed.

Texas Distributor Stages Machine Tool Exhibition

HOUSTON—Wessendorf, Nelms & Co. of this city staged a machine tool show April 29-May 7 for the benefit of firms in that area unable to attend the machine tool show in Chicago. Those participating were Brown & Sharpe Mfg. Co., Hardinge Brothers, Inc., Jones & Lamson Machine Co., Potter & Johnston Co., and Rockford Machine Tool Co.

Each of the manufacturers sent machines, demonstrators and members of engineering and sales departments to help handle visitors, who numbered 701 from industrial plants and 267 engineering students. Machines were tooled up on production work for the manufacturers of oil field equipment.

Iron and Steel Institute Awards Gary Medal

NEW YORK — Benjamin F. Fairless, president, United States Steel Corp. and vice president, American Iron and Steel Institute, was presented the Gary Memorial Medal for outstanding achievement in the iron and steel industry at the dinner of the Institute's 57th general meeting in the Waldorf-Astoria Hotel May 26.

It was the first time the Gary Medal, top honor in the industry, had been awarded by the board of directors of the Institute since 1944. It is awarded for "Outstanding achievements in handling problems of steel supply for war and for peace, and in fostering a better understanding of this industry."

$750 Million in Phantom Orders

VIRGINIA BEACH, Va.—$750 million worth of machine tool "phantom" orders for industrial mobilization have been placed to date with the nation's manufacturers by the National Security Resources Board, members of the Machinery Dealers National Association were told by F. M. Shields, the Board's assistant director of production, speaking at the MDNA annual meeting here May 26.

"Manufacturers thus are able to make their own plans for production, for expansion, for manpower and for supplies and parts," he said.

Speaking on plans of the Board regarding small business, Mr. Shields said that the Board "contemplates a thorough advance appraisal of small manufacturing plants for the production of war materials. To overlook this source of potential industrial strength would be not only unfair to great numbers of patriotic American citizens but would be selfishly short-sighted from the standpoint of national security itself," the speaker stated.

"Small manufacturing facilities, which are already dispersed in widely separated areas, would be in a position to bridge a production gap that might be disastrous in the event of wholesale destruction of large factories in highly congested—and, therefore, vulnerable—areas," he added.

New officers elected at the MDNA meeting were: Frank J. Lunney of Frank J. Lunney Co., Philadelphia, president; Joseph T. Weiss of Interstate Machinery Co., Inc., Chicago, first vice president; William H. Sharpe of Machine Tool Sales Co., Philadelphia, second vice president; Al Weisbecker of Rosenkranz, Weisbecker Co., New York, treasurer.

How We Cast Steel Forgings To Be Studied by British

WASHINGTON — American methods of casting steel forgings will be studied by a British productivity team arriving this month. Sixteen workers, technicians and supervisors from Britain's drop forging industry comprise the team, sponsored by the Anglo-American council on productivity.

The team is the third of 30 British groups which will visit this country to study ways and means of stepping up Britain's productivity. The first two were from the steel foundry and rayon weaving industries.

41 'Graduate' As Machinists

OAKLAND, Calif. — Training apprentices for the skilled trades is equally important with drilling military forces in guarding the nation's security, Secretary of Labor Maurice J. Tobin declared at the mass graduation here of 857 apprentices on May 17. The "commencement exercises" for apprentices trained in 51 crafts in Alameda and Contra Costa counties was the largest of its type ever held, with 41 of the graduates receiving machinist certificates.

Secretary Tobin warned that "We could lose a future war if we do not train enough of these key skilled workers." He emphasized that they cannot be turned out on an emergency basis.

A total of 330 management and labor representatives serve in the 55 Joint Apprenticeship Committee (JAC) groups in the two counties which helped train the graduates. Now registered by State Apprenticeship Agencies or the Bureau of Apprenticeship are 233,000 apprentices in 29 states, California leading with 34,386.

The importance of the apprenticeship program is particularly pointed up in the rapidly growing industrial plant of California. An estimated minimum of 25,000 more trainees beyond those now registered are needed in the state.

The state is especially short of younger journeymen, because of the wartime substitution of emergency specialized training for long term apprenticeships. A survey of six typical machine shops in Oakland, for instance, showed that 36% of the journeymen were over 50, indicating there will be a shortage of skilled men for a "catch up" period several years long without even taking into consideration new industry needs.

Engine Manufacturers to Get Big Slice of Mobilization Contracts

WASHINGTON — Expenditures for industrial mobilization of the aircraft industry will approximate $20 million for fiscal 1950, most ($16 million) to be spent by the Air Force, the balance by the Navy.

Phase III contracts with individual manufacturers for high volume production studies to be made of their products will account for $13 million of the total, the Air Force spending $11.6 million of this, the Navy $1.4 million.

Engine manufacturers will get the largest share of the Air Force contracts. General Electric and its subcontractors will get $825,000 for high volume production studies on the J-47 turbojet. General Motors' Allison division will get $1,350,000 for similar studies on the J-33 centrifugal flow turbojet and the J-35 axial flow turbojet. Pratt & Whitney will get $800,000 for production studies on the J-48 turbojet and $300,000 for studies on the Wasp Major piston engine.

To Study Trainer Engines

A total of $155,000 will be used for production studies of other engines to be used on Air Force trainers.

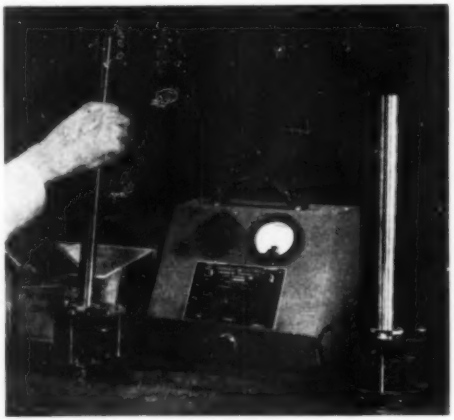
In addition, Phase III contract funds will be allocated for the following studies: Propellers, $1,219,619; fire control systems, $2,225,000; bombing systems, $765,000; bomb sights, $382,500; radio and radar, $828,750; landing gears, $433,500; turbo-superchargers, $178,500; test equipment, $76,500; auto-pilots, $137,500; instruments, $114,750; ground handling equipment, $65,880.

Other Air Force industrial mobilization allocations include: $435,000 to continue existing preparedness contracts; $750,000 for resource requirement data on manpower, machine tools, etc.; $150,00 for purchase of basic studies on expansibility of industry, planning factors, etc.; $55,000 for protection of industry in wartime; $400,000 for purchase of engineering and technical services on studies of new industrial techniques, analysis of planning data and development of new manufacturing equipment; $1,625,000 for maintenance of stand-by plants; and $2,521,000 for acquisition of reserve machinery and equipment.

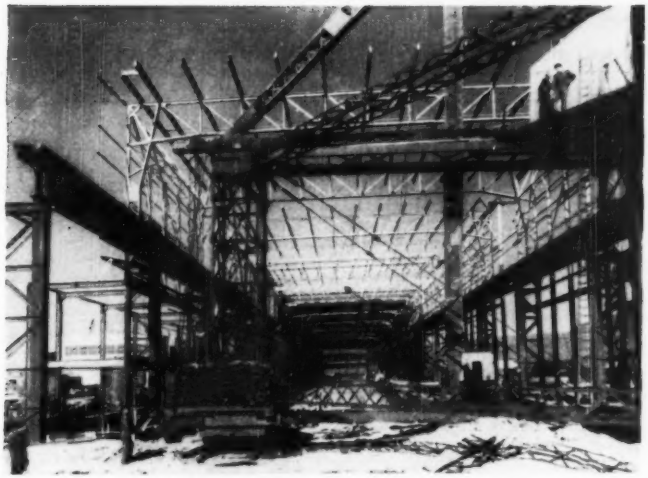
Navy plans to spend $1,436,000 for Phase III contracts in fiscal 1950 on a new airframe and another turbojet engine. Balance of the Navy allocation will go to: stand-by plants, $120,000; machine tools and production equipment reserve, $1,146,000; plant utilization studies, $354,000; and industrial resources studies, $844,000.

Pressed Metal Institute Will Meet in Cleveland

CLEVELAND — The first national convention of the Pressed Metal Institute will be held here at the Hotel Cleveland on July 20-22, it was announced by O. B. Werntz, managing director, on behalf of Woodard Jeschke, chairman of the executive committee of PMI. The program will include a visit to a local strip mill and business sessions on the problems of the metal stamping industry. Good attendance is expected by representatives of the 200 member firms in trade association. A technical session will be handled by the Toledo district, of which Ray Peterson is now chairman. And one banquet meeting will probably be addressed by a prominent legislator.



***GE MAGNETIC** Comparator used by Winchester Repeating Arms Co., New Haven, Conn., in production-line testing of stock steel and small ferrous parts steps up checking rate to about 1000 units per hour. Apparatus compares rods, bolts, springs, and small fabricated parts with a preselected standard of the same size and shape to detect a difference in composition, heat treatment, or other characteristics.*



NEW PLANT of the Steel Company of Wales will require 70,000 tons of steel work. The roofed-in section at the rear of this photo—the ingot stripper bay—is the start of a 4,000-ft-long building. The new plant, once into full production in 1952, will produce 20,000 tons a week

Steel Producers in Wales Pool Resources to Form New Company

WASHINGTON—Major steel producers in South Wales England have pooled their resources and formed the $240-million Steel Company of Wales, Ltd. The new company means another 1,250,000 long tons added to England's steel production each year. Also, it means $35.5-million in business for U. S. steel mill equipment manufacturers. First production is expected in the latter half of 1950.

Once the new plant is completed, the United Kingdom hopes to raise tinplate exports to 375,000 tons a year along with 175,000 tons of sheet. An annual output of 350,000 tons of tinplate as planned will be 70% of U.K.'s entire tinplate capacity. Other production will include 300,000 tons of cold rolled sheets, 150,000 tons each of hot rolled sheets and plates.

Fully Integrated Plant

The main installation, already under construction, will be at Margam, near Port Talbot, Glamorgan, and will be a fully integrated plant, including facilities for the unloading and preparation of ore, coke ovens, blast furnaces, melting furnaces, a slabbing mill, a hot strip mill, two tinplate mills and one sheet mill. The hot strip mill will be a new ten-stand 80" continuous mill producing hot coil strip up to 72" wide for conversion to sheet and tinplate. Its output is planned at 1.2-million long tons a year. It will be one of the largest in the world.

There is under consideration a proposal to build a second tinplate mill nearby, but ECA, on the basis of future market forecasts, hasn't approved any ECA dollars for its construction.

Production from the Margam plant will not only reduce Western Europe's estimated 250,000 long ton dependence on U. S. tinplate in 1951, but will intensify competition on South American and other steel export markets.

$17.7 Million in Contracts Let

Of the total $35.5-million to be spent in the U. S., $17.7-million worth of contracts have already been let (subject to escalator provisions). An additional $9.2-million in orders for U. S. equipment either are still to be placed or haven't been announced. So far cash payments of $14,643,925 have been made on account to U. S. suppliers. The British will be reimbursed the full $27-million cost. Some $1.5-million in payments made before April 3, 1948 will not be paid by ECA.

Equipment for contracts still to be let include a $5,400,227 slabbing and hot strip mill, and a $3,750,000 tinplate mill.

A second cold reduction mill to be built nearby will call for an additional $8.5-million in U. S. equipment, but no details are available as yet. So far, ECA has approved $27-million for the Wales Company.

ECA Approves $10.7 Million For Austrian Steel Mills

WASHINGTON—Austrian steel production gets a boost through ECA's approval of use of $10.7 million of its funds for increasing steel plate and sheet production in that country. The money will go towards paying dollar costs of a 60-in. hot strip mill and a 46-in.-slabbing and blooming mill to be installed at Linz for the government-owned VOEST (United Austrian Iron and Steel Works Co.).

Austria hopes through the construction of the hot strip mill to raise annual finished sheet and plate production from a current 152,000 metric tons to 240,000 metric tons in 1951. This would improve Austria's exchange position by some $19 million a year.

The slabbing and blooming equipment, to be supplied by Mesta Machine Co., Pittsburgh, consists of a two-high reversing mill with high speed screw downs and a maximum height of 1600 mm. The diameter of the rolls is 46 in. with a length of 120 in. Equipment includes necessary approach and working roller tables, buggy, hydraulic slab sheers, runout tables and pilers. Westinghouse Electric Corp. will supply electrical accessories under subcontract to Mesta.

Nearly all of the $10.7 million will go to Mesta; part of this will be paid in ECA financing by Mesta to Westinghouse to cover subcontracts.

Industrial Diamond Exhibition

NEW YORK—An exhibition of industrial and gem diamonds is being held by the Museum of Natural History until mid-July, staged by the Standard Diamond Tool Corp. of this city. Features of the exhibition include one of the largest black industrial diamonds in existence, weighing 337 karats; illustrations of every phase of diamond cutting, of products that use diamond tools, and illustrations showing use of the tools.

Correction—In the Special Report, "More Color in the Shop," June 2, **A. M.**, credit was inadvertently omitted for the material on color symbolism, pages 82-83. Most of this material was taken from a booklet prepared by Faber Birren, color consultant for the General Printing Ink Corporation.

Detroit

STUDEBAKER TRANSMISSION TOOLING ORDERS PLACED . . . NEW ENGINES PLANNED BY MANY COMPANIES . . . SLOAN PREDICTS SHIFT OF MARKET

Tooling orders for the new automatic transmission to be produced for Studebaker by the Detroit Gear Division of Borg-Warner Corp. have been flowing out at a rapid rate, and seem pretty well placed by now. A large share of these orders fall in the special equipment class, and have served to give a decided nudge to the order banks of several of the participating companies.

All in all, the outlook is somewhat brightened for the special producers. Detroit firms have participated in some recent releases of note from tractor manufacturers and others outside of the automobile field. And inside the auto industry itself prospects seem somewhat better over the medium and longer term.

An on-again-off-again program for a new engine at Buick appears to be on an ascending grade again. Some changes have been made in the engine which will power Buick's new Special series, destined to be introduced in midsummer — mainly to step up compression a bit. The thinking at Flint, as machine tool makers see it, is steadily coming toward focus on a brand-new line of engines for the rest of the line. The objective, of course, would be to provide a high compression type of engine akin to that on Cadillac and Olds.

Engine Plans on the Boards

Rumors are strengthening, too, that Chrysler and Dodge have some fairly advanced engine plans on the boards. As a matter of fact, many companies fall in this same category —Nash, Ford, and Kaiser-Frazer, to name a few. The more important consideration is when executive decisions will be forthcoming to let the prints go for bid and manufacture, but the noteworthy fact is that the programs do exist in potential if not actual stages.

The beginning of construction on the long-awaited General Motors technical center northeast of Detroit should result in at least a fair trickle of equipment purchasing. First buildings to go up will be those of the engineering group—administration and drafting, shop and dynamometer buildings, comprising 235,000 sq ft of office and shop space. Very soon the research laboratories division group—metallurgical, laboratory, mechanical, and processing buildings—will be started; this group will cover 427,000 sq ft. Styling and process development groups will follow.

Production equipment for the new Chevrolet automatic transmission is moving rapidly to Cleveland these days, indicating that some kind of start on manufacturing will be undertaken during the fall. This would imply an introduction of the new automatic—first to appear on a "popular price" car—around the turn of the year.

Chevrolet, incidentally, has vaulted back into the position of No. 1 producer in the industry, a place held for more than a decade. The GM volume leader overtook Ford just before the latter was struck; and the three idle weeks at the Rouge cemented Chevrolet's grip.

Lower Production Levels Seen

Productionwise, the most noteworthy observation of recent weeks came from A. P. Sloan, Jr., chairman of General Motors, in the course of his remarks at the annual stockholders' meeting. "In all probability," he said, "the latter part of the year will see a lowering of existing production levels on the part of all producers, General Motors included, because (a) automotive products then should be in ample supply and (b) the seasonal trend, inoperative since the war will, in all likelihood, manifest itself in a reduction in sales to consumers, thus necessitating a reduction of production to adjust field stocks to a lower seasonable level of consumer deliveries."

When the chairman of GM, whose products have been generally conceded as "hottest" in the industry, heralds a shift of market, you can be fairly sure that one is not far off. The big production periods of April (565,411 assemblies) and May (about 500,000) will probably be roughly equaled in June, with Ford resuming as rapidly as possible; but after that a definite decline seems in prospect. If the second quarter sees produced around 1,600,000 units in all U. S. and Canadian plants, the third may slope off to about 1,350,000. The fourth's prospects are still too murky for estimate, but they will be further reduced.

Body Engineers to Meet

The American Society of Body Engineers, Inc., will hold its fourth annual technical convention, including a product exhibit, at Rackham Memorial Building in Detroit Nov. 2-4. Eight technical sessions will be held. Arthur L. Bradley, chief engineer of Wettlaufer Mfg. Co., president of ASBE, has named Glenn F. Doyle, engineering supervisor of Ford Motor Co., as chairman.

For the second time this year GM prices were reduced from $10 to $40, in line with lowered wages, cut 1¢ an hour under the sliding scale living cost bonus arrangement with the Auto Workers and Electrical Workers Unions.

George W. Walker, who designed the 1949 Ford, has been retained for further consultation work on forthcoming car and truck models of all Ford divisions.

***CHESTER RICKER.** Detroit editor of American Machinist, sits behind the wheel of his 1949 Series "88" Futuramic Oldsmobile which he used as his official car at the 500-mile Indianapolis race on Memorial Day. He has been director of timing and scoring at the international event for a number of years*

Names in the News

H. P. Rees, general works manager of the Lowellville, Ohio, plant of Sharon Steel Corp., has been named general superintendent of both the Lowellville and the Farrell, Pa., plants, which have combined operations under one management. **William J. McGaffney** has been named assistant general superintendent.

Frederick J. Messier has been named sales manager of Washington Mills Abrasive Co., North Grafton, Mass.

Dr. H. B. Walker has been named manager of a new product development department established by E. F. Houghton & Co., Philadelphia.

G. A. Lorz has been named superintendent of operations at the Mackintosh-Hemphill Co.'s Garrison plant, Pittsburgh. **C. R. Hodgson** has been named superintendent of operations at the company's plant at Midland, Pa.

R. Bruce McKenzie has been appointed sales engineer, Butterfield Division, Union Twist Drill Co., Derby Line, Vt. He will cover California, with headquarters in Los Angeles.

Fred T. Miller and **R. A. Stumm, Jr.,** have been named vice presidents of Adel Precision Products Corp., Burbank, Calif. Mr. Miller will be in charge of engineering and sales, Mr. Stumm in charge of manufacturing.

J. H. Broderick

J. H. Broderick has been named field sales manager of Geometric Tool Co., New Haven, Conn., a division of Greenfield Tap & Die Corp., Greenfield, Mass. He has been with Geometric as chief inspector since 1935.

C. I. Ochs, president of Eaton Mfg. Co., Cleveland, and **Sam W. Emerson,** president of Emerson Construction Co., Cleveland, have been named directors of National Acme Co.

Robert A. Morris, assistant to the president, Acme Steel Co., Chicago, has resigned to devote full time to his work as president of Ferguson-Lander Box Co., Chicago.

Raymond J. Casey has been named coordinator of industrial relations and training of The Midvale Co., Philadelphia.

George L. Meyer, Jr., a vice president of Stewart-Warner Corp., Chicago, since 1941 and an employee since 1907, has been elected to the board of directors.

A. A. Cambria has been appointed director of sales, Progressive Tool & Die Co., Worcester, Mass.

Gosta Vennerholm, supervisor of Ford Motor Co.'s metallurgical research section of the process engineering laboratory, Dearborn, Mich., has been awarded the William H. McFadden Gold Medal for contributions to the foundry industry.

J. R. Mudler has been named purchasing agent of the Cleveland plant of Oliver Corp., succeeding **M. D. Braund,** resigned.

Allan Craig has been named general manager of the southwestern division of Link-Belt Co., Chicago, with headquarters at Houston. Other appointments: **Michael J. Perry,** sales manager, southeastern division, Atlanta; **Andrew K. Kolar,** district manager, Moline, Ill.; **John D. Riley,** district manager, Newark, N. J.

Arthur J. Wieland has resigned as executive vice president of Willys-Overland Motors, Inc. He will continue as a director.

William B. Crump has been named district manager in the Michigan territory, Chicago Latrobe, with headquarters in Detroit.

W. R. Toeplitz and **Samuel S. Connor** have been named directors of Bound Brook Oil-Less Bearing Co., Bound Brook, N. J.

Richard A. Heald, treasurer of The Heald Machine Co., Worcester, Mass., was recently made president.

J. B. Johnson

J. B. Johnson has resigned as vice president and general manager of Bryant Chucking Grinder Co., Springfield, Vt., after 39 years with the firm. **J. H. Beardsley,** assistant to the president, has been named general manager. Mr. Johnson has been vice president and general manager since 1939. Under his guidance the company received five Army-Navy "E" awards. He will continue as a director of Bryant.

Donald L. Price, Detroit district manager of the Abrasive Division, Norton Co., Worcester, Mass., has been named sales manager of a newly formed Central Region which includes the territories around Cleveland and Detroit. **William A. Russell** has been named to succeed Mr. Price in Detroit.

John E. Menz has been appointed product manager, electrical conductor, to direct the sale of Kaiser aluminum cable and other products produced at The Permanente Metals Corp.'s new rod, bar, wire and cable plant at Newark, Ohio.

Grover J. Meyer has been named president and director of The Lombard Corp., Youngstown, Ohio, succeeding **D. L. Lombard,** who is now chairman.

J. H. Ferguson has been named district manager of the Akron, Ohio, branch office of The Bristol Co., Waterbury, Conn.

Harry A. Fohl has been named chief engineer, Lukens Steel Co., Coatesville, Pa. **Neils H. Jensen** has been named assistant chief engineer and **Malcolm B. Antrim** superintendent of electrical maintenance.

Tom W. Ryan has been appointed manager of operations of Basic Refractories, Inc., Cleveland.

Paul Watts has been named general sales manager of Skilsaw, Inc., Chicago. He has been Pacific Coast manager since 1947.

Charles E. Schley has been elected chairman of the board of the Philadelphia Bronze & Brass Corp. **Donald Bryden** has been elected president and director, and **Gordon E. Keim** has been elected vice president and director.

Allan M. Douglass, formerly sales manager of the Insulation Division of National Gypsum Co. has been named general manager of the Kool-Shade-Storm-Shade department of the Ingersoll Steel Division of Borg-Warner Corp., Chicago.

Arthur J. Fausek, president of Modern Engineering Co., St. Louis, Mo., has been elected president of the International Acetylene Assn., New York. **C. E. Monlux,** vice president of The Linde Air Products Co., was elected vice president. The Association's 1948 James Turner Morehead Medal has been awarded to **Herman Van Fleet** of Air Reduction Co., New York.

John W. Belanger

Nicholas M. DuChemin

John W. Belanger, manager of General Electric Co.'s turbine divisions at Schenectady, N. Y., and Nicholas M. DuChemin, manager of the company's meter and instrument divisions at Lynn, Mass., have been appointed assistant general managers of the GE Apparatus Dept. **James H. Goss** has been named manager of engineering in the control divisions of the Apparatus Dept.

G. F. Clipsham, assistant to the president, **William Irrgang,** director of plant engineering, and **L. K. Stringham,** director of welding development, have been elected to the board of directors of Lincoln Electric Co., Cleveland.

Jack F. Brossart, until recently general sales manager of Industrial Filter & Pump Mfg. Co., Chicago, has been named Pacific Coast manager. **Harold W. Faint,** recently manager of the Ion Exchange Department, has been named general sales manager, succeeding Mr. Brossart.

James G. Gunderson has been named sales engineer in the New England territory for Federal Products Corp., Providence, R.I.

Louis T. Friedman, formerly assistant professor of engineering at Champlain College, has been named head of the Metallurgical Engineering Dept. of Sam Tour & Co., Inc., New York.

Robert F. Myers has been named general sales manager of The Lees-Bradner Co., Cleveland.

Henry T. Schlachter and **Bob Strange** have been named representatives in the Detroit area for Detroit Broach Co.

Harold J. Zilske has been appointed sales engineer of The Parker Appliance Co., Cleveland, serving the Philadelphia area.

George A. Spencer has been named to head the Los Angeles sales office of American Nickeloid Co., Peru, Ill.

Hugo W. Jones has been named assistant sales manager of Adamas Carbide Corp., Harrison, N. J.

Paul W. Erickson has been appointed manufacturing superintendent for the Electronics Division of Sylvania Electric Products, Inc., at Boston.

Russell C. Jones, president of the Griscom-Russell Co., New York, will retire from that position, continuing as a director. **Kenneth B. Ris,** vice president in charge of sales, will succeed Mr. Jones. **Charles D. Steffans,** sales manager, has been elected vice president in charge of sales, and **James W. Elizardi** has been elected vice president in charge of petroleum sales.

Clayton E. Scholes has been appointed general manager of the Ohio Stainless & Commercial Steel Co.'s new OSCO Steel Division in Detroit. **Nate A. Wade** has been appointed assistant manager and **Owen W. Brock,** warehouse manager.

Gilfry Ward has been appointed vice president in charge of sales of the American Manganese Steel Division of the American Brake Shoe Co., New York. **Eads Johnson, Jr.,** has been named assistant vice president of the Southern Wheel Division. **Donald C. Sheldon** has been elected assistant treasurer and **Kenneth A. Anderson** has been elected assistant secretary. **James R. Shepard** has been named western district works manager and **Thomas J. Wood** has been named eastern district works manager of the Brake Shoe & Castings Division.

Obituary

Charles F. Newpher

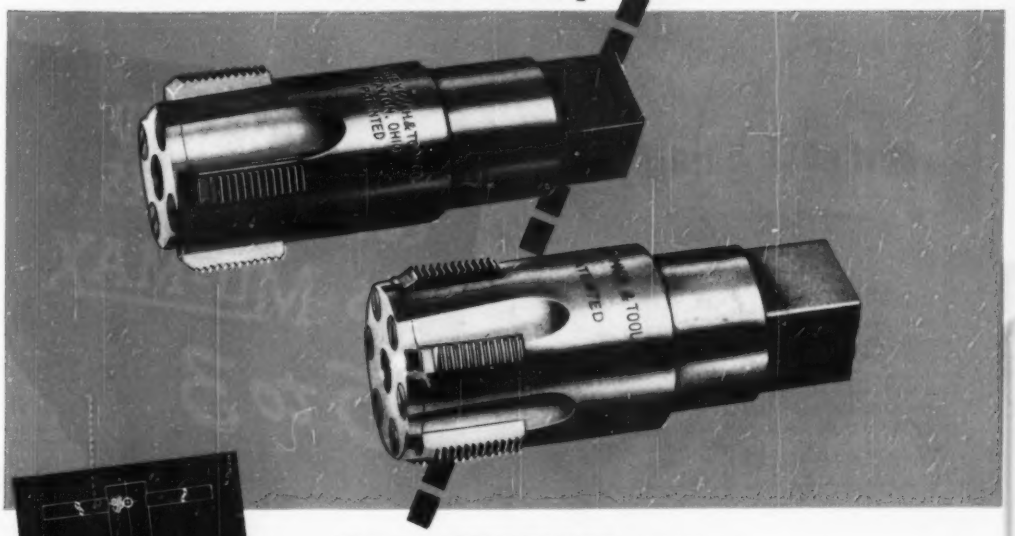
Charles F. Newpher, 60, executive vice president of The National Screw & Mfg. Co., Cleveland, died May 15. He joined National in 1937 as assistant to the vice president. For 26 years previous he had been associated with the Upson Nut Co. He became vice president in charge of sales and a director of National Screw in 1939, and in 1948 was made executive vice president. During World War II, Mr. Newpher was a member of the War Production Board. President of the American Institute of Bolt, Nut and Rivet Manufacturers in 1940, his other activities included chairmanship of the committee of the American Standards Association on standardization of bolts, cap screws, and nuts.

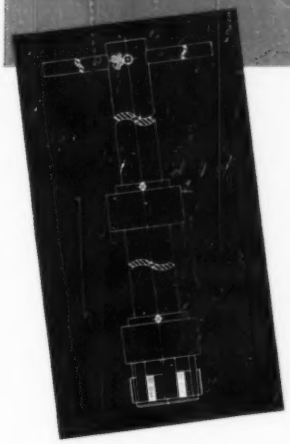
Ernest L. Davis, 69, president of Monmouth Products Co., Cleveland, died at his home in Cleveland May 18.

Orville B. Ewing, manager of the New Orleans district office for The Youngstown Sheet and Tube Co., Youngstown, Ohio, died May 11.

Edward S. "Ted" Walton, 58, in charge of excess accumulations in the flat rolled sales department of The Youngstown Sheet & Tube Co., died May 17.

IF YOU HAVE A LOT OF THREADING,





Taps "EHB" and "RHB" (4 and 6 chasers) models are standard in sizes from 1¼" to 6". Special taps of this kind can be made entirely to your specifications. Bottoming taps are available by use of overhanging chasers.

these MURCHEY taps will *Save you money*

Contrast these Murchy Adjustable Taps with the conventional, solid tap on a straight unit cost basis (cost per inch of threaded hole). Every tap, after a certain amount of use, has to be re-ground. You can regrind the chasers of these taps and still retain exact size because of their adjustable feature. In fact, you can keep on regrinding the chasers both on the chamfer and the face and adjusting them radially outward until there are practically no cutting teeth left. And then, merely with a new set of chasers, you can start the whole cycle over again. A set of chasers costs a lot less than a new, solid tap.

Another saving is that a single tap body may be used for a wide range of sizes and pitches with the appropriate chasers.

5072

Write for catalog

MURCHEY MACHINE & TOOL CO.

Since 1904

Lower cost per thread . . .

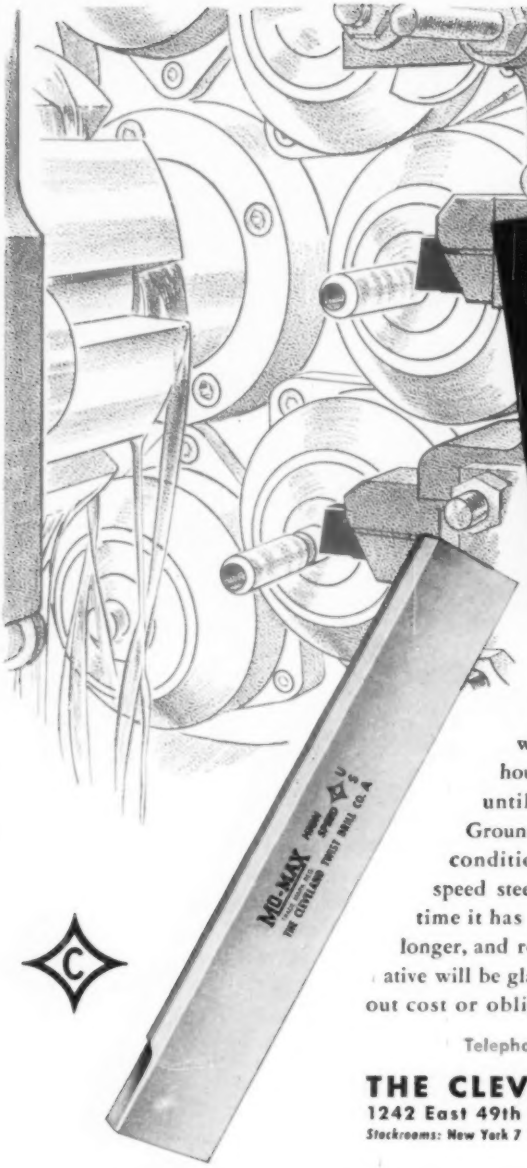
WITH MURCHEY TOOLS

MURCHEY

DAYTON 1, OHIO, U. S. A.

SUBSIDIARY OF THE SHEFFIELD CORP.

Manufacturers of collapsible taps, self-opening die heads (tangent and radial chaser types) and special threading tools



FOR HIGH SPEED CUT-OFF BLADES... IT'S MO-MAX 5 to 3

A machine shop superintendent was satisfied when the cut-off blades on this job lasted 3 hours before regrinding. He was satisfied, that is, until he discovered that MO-MAX High Speed Ground Cut-off Blades lasted 5 *hours* under identical conditions. MO-MAX is a molybdenum high speed steel with superior cutting qualities. Time after time it has proved its ability to cut faster, "stand up" longer, and reduce costs. A *Cleveland* Service Representative will be glad to give a demonstration in *your* plant, without cost or obligation. Ask our nearest Stockroom, or . . .

Telephone Your Industrial Supply Distributor

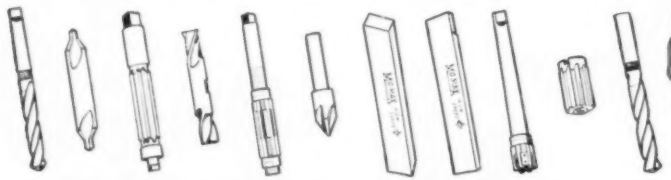
THE CLEVELAND TWIST DRILL CO.

1242 East 49th Street • Cleveland 14, Ohio

Stockrooms: New York 7 • Detroit 2 • Chicago 6 • Dallas 1 • San Francisco 5 • Los Angeles 11

E. P. Barrus, Ltd., London W. 3, England

ASK YOUR INDUSTRIAL SUPPLY DISTRIBUTOR FOR THESE AND OTHER *Cleveland* TOOLS



Diagnosis of Machining Troubles...I

COURTESY GORHAM TOOL COMPANY

Single-Point, Flat and Circular Forming Tools

The best approach to overcoming cutting-tool troubles consists of an on-the-job analysis of the reasons for tool failure or poor finish. When the type of trouble has been determined, steps can be taken to remedy the conditions responsible for the failure. Often more than one of the troubles cited will appear at the same time. But careful study of the actual operation of the tool will serve to correct the troubles as they are isolated.

PROBABLE CAUSE	SUGGESTIONS FOR CORRECTION
BREAKAGE	
Excessive feed	Reduce feed rate to a point where the tool will stand up under the work pressure or strengthen the tool by design revision.
Tool deflection	Reduce overhang. Increase tool support rigidity.
Excessive vibration	Keep machine tool, tool holders, work fixtures, etc., in first class condition. Reduce relief angles to minimum required. Follow suggestions for correcting for tool deflection.
Clamping difficulty	Make sure that methods of holding the tool do not induce stresses causing breakage under cut.
Improper resharpening	Check resharpening methods to make sure that tool is not cracked by improper resharpening.
Dull tool	Do not run tool past the time at which it needs resharpening.
CHIPPING OF CUTTING EDGE	
Excessive feed	Reduce feed rate or redesign tool to strengthen cutting edge. Possibly use a tougher tool material.
Improperly ground chip breakers or clearances	Avoid on-the-job additions of chip breakers or curlers. Make sure that specified clearances are maintained or reduce the clearances if excessive.
Excessive vibration	Keep machine tool, tool holders, work fixtures, etc., in first class condition. Reduce relief angles to minimum required.
Excessive relief	Do not exceed recommended amounts of relief when resharpening.
BURNING OF CUTTING EDGE	
Excessive speed	Reduce surface speed to a point at which the tool will stand up. Possibly use a tool material of higher red hardness.
Hard work material	Check hardness of work material to keep it within range of machinability under the operating conditions.
Inadequate cutting fluid	Increase flow of cutting fluid or improve direction of flow to cool cutting edge in the cut. Consider use of cutting fluid with better cooling properties with temperature maintained at 70° to 80° F.

PROBABLE CAUSE	SUGGESTIONS FOR CORRECTION
CRATERING	
Excessive speed or feed or both eroding top of tool	Reduce speed or feed to eliminate excessive cratering. Possibly use a more abrasion-resistant tool material.
Insufficient rake angle	Increase rake angles to reduce friction of chip against tool.
ROUGH FINISH	
Too high feed rate	Reduce feed rate.
Too low surface speed	Increase surface speed but avoid reaching speed at which tool burns.
Dull tool	Do not run tool past the time at which it needs resharpening.
Improper cutting fluid	Change to cutting fluid recommended for finish on particular work material.
CHIP CLOGGING	
Chips too long	Use separate chip breakers or grind chip breaker or curler into tool.
Insufficient cutting fluid	Increase pressure of cutting fluid or so direct flow that chips are washed away.
RUBBING	
Too little relief or clearance	Increase relief or clearance until tool does not drag and rub in cut. Do not weaken tool by exceeding necessary relief.
Tool cocked in holder	Make sure that tool is held in correct relation to the work.

Steel-Weld FABRICATION

Here is more evidence of fine workmanship in both the production and machining of Steel-Weld Fabricated parts of heavy machinery assemblies. This is the quality of workmanship YOU can expect from the Mahon organization . . . because, Mahon offers a unique source for welded steel in any form, regardless of size, weight, or shape . . . a source with complete facilities for producing, magnetic inspection, stress analyzing, normalizing, grit blasting, machining and spray painting. These facilities manned by highly skilled craftsmen under the supervision of a staff of design engineering experts, are your assurance of a better, smoother appearing job, embodying every advantage of Steel-Weld Fabrication.

THE R. C. MAHON COMPANY
DETROIT 11, MICHIGAN

Engineers and Fabricators of Welded Steel Machine Bases and Frames, and Many Other Welded Steel Products

MAHON

Diagnosis of Machining Troubles...II

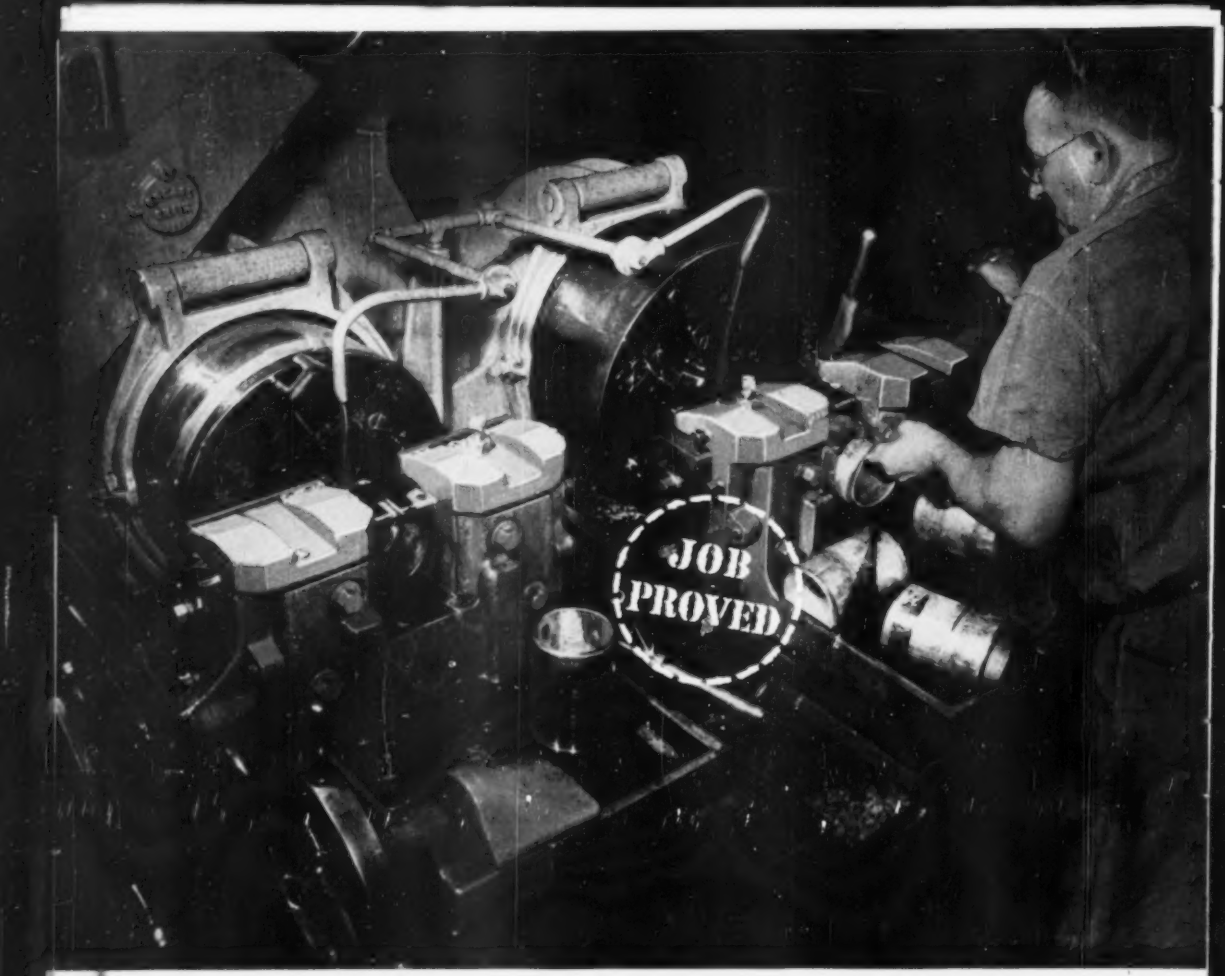
COURTESY GORHAM TOOL COMPANY

Multiple-Point Rotating Tools

The best approach to overcoming cutting-tool troubles consists of an on-the-job analysis of the reasons for tool failure or poor finish. When the type of trouble has been determined, steps can be taken to remedy the conditions responsible for the failure. Often more than one of the troubles cited will appear at the same time. But careful study of the actual operation of the tool will serve to correct the troubles as they are isolated.

PROBABLE CAUSE	SUGGESTIONS FOR CORRECTION
BREAKAGE	
Excessive feed	Reduce feed to a point where weakest cross section of tool will withstand the required torque and thrust.
Too many teeth engaged in cut at same time	Reduce number of teeth in cutter or strengthen cross section to carry load.
Chip packing	Reduce number of teeth in cutter or increase chip wells by revising tooth shape.
Feeding without uniform rotation of tool	On arbor cutters, use well fitting key extending into collars on both sides. On shank type cutters, make sure driving mechanism is adequate.
Dull cutter	Do not run tool past the time at which it needs resharpening.
Improper resharpening	Check resharpening methods to make sure that tool is not cracked by improper resharpening.
CHIPPING OF CUTTING EDGE	
Excessive feed	Reduce feed rate or redesign tooth shape to strengthen cutting edge. Possibly use a tougher tool material.
Excessive vibration	Keep machine tool, arbors, supports, work fixtures, etc., in first class condition. Use an arbor of sufficient size to overcome torsional vibration.
Excessive relief	Do not exceed recommended amounts of relief when resharpening.
BURNING OF CUTTING EDGE	
Excessive speed	Reduce surface speed to a point at which the tool will stand up. Possibly use a tool material of higher red hardness.
Hard work material	Check hardness of work material to keep it within range of machinability under the operating conditions.
Inadequate cutting fluid	Increase flow of cutting fluid or improve direction of flow to cool cutting edge in the cut. Consider use of cutting fluid with better cooling properties.
CRATERING	
Excessive speed or feed or both eroding face of tooth	Reduce speed or feed to eliminate excessive cratering. Possibly use a more abrasion-resistant tool material or apply a case treatment to present tools.
Insufficient rake angles	Increase rake angles to reduce friction of chip against tooth face.

PROBABLE CAUSE	SUGGESTIONS FOR CORRECTION
ROUGH FINISH	
Too high feed rate	Reduce feed rate.
Too low surface speed	Increase surface speed but avoid excessive speed.
Dull tool	Do not run tool past the time at which it needs resharpening.
Improper cutting fluid	Change to cutting fluid recommended for finish on particular work material.
Milling against the feed	If conditions warrant, use in-cut or climb milling.
CHIP CLOGGING	
Insufficient chip room	Reduce number of teeth or revise shape of tooth to provide ample chip room.
Insufficient cutting fluid	Increase pressure of cutting fluid or so direct flow that chips are washed out of teeth or flutes.
Tool magnetized	Make sure that the tool is demagnetized after being held on a magnetic chuck.
RUBBING	
Insufficient concave	Increase concave to avoid rubbing.
Work closing in on cutter	Keep work piece cool or clamp so that it cannot shift into cutter.
Axis of tool out of relation to feed travel	Check machine tool to make sure that it is properly lined up.



CHASER LIFE INCREASED 50%

Sun Cutting Oil Improves Quality of Threads, Steps-up Pipe Nipple Production

Operation: Threading 4" pipe nipples

Machine: Landis Threading Machine

Material: 4" galvanized welded steel tubing SAE 1025-1040

Speed: Threading 1½" on each end of about 300 pieces per 8-hr. day

Chaser Life: 3 days before resharpening

Cutting Fluid: Sun Cutting Oil 31W

A manufacturer threading pipe nipples was not getting satisfactory finished threads with the cutting fluid in use. Chaser life was abnormally short, resulting in excessive downtime and high percentage of rejects, with consequent loss of production.

Changing to Sun Cutting Oil 31W, this shop increased chaser life 50 percent, and reports that "the threads are the best we ever made." With rejects practically eliminated and downtime for changing chasers reduced to the absolute minimum, production has greatly increased.

Sun Cutting Oil 31W is a dark, free-flowing, sulphurized oil. It is recommended for heavy duty jobs where an emulsified cutting oil is not suitable. For further information about Sun Cutting Oils or other "Job Proved" Products for the metalworking industry, call or write the nearest Sun Office. The services of a Sun Engineer are available without obligation.

SUN OIL COMPANY · *Philadelphia 3, Pa.*

In Canada: Sun Oil Company, Ltd.
Toronto and Montreal

SUN PETROLEUM PRODUCTS

"JOB PROVED" IN EVERY INDUSTRY

SUNOCO

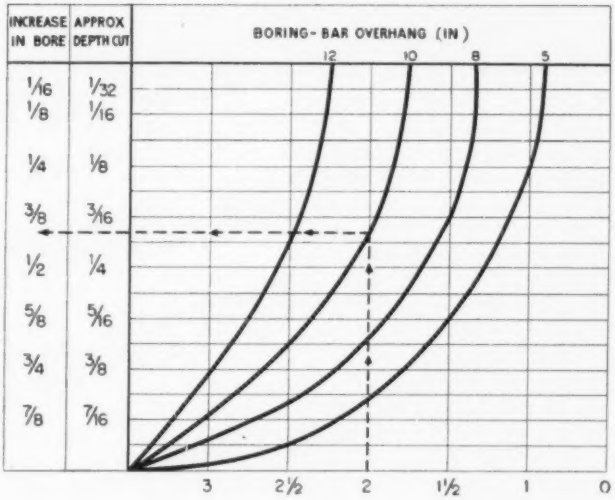
Chart for Number of Boring Cuts

COURTESY METHODS DEPT.,
CLEVELAND AUTOMATIC MACHINE CO.

This chart, developed for use in connection with carbide tooling, enables the rate-setter to determine the number of boring cuts to allow for a given piece. Data that must be known are: the total amount of stock to be removed from the hole, the length of the hole and the size of the boring bar.

Example: Hole size, 2½ in. to be increased to 3½ in., or total stock removal, 1 in. Length of hole, 8 in. Boring-bar size, 2 in. Estimated boring-bar overhang, 10 in.

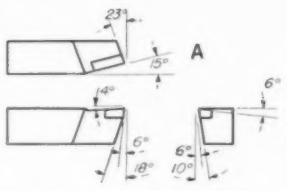
Solution: From the 2-in. bar size, project vertically to the curve for 10-in. overhang. Then from the point of intersection, project to the left. The permissible increase in diameter is ¾ in. (reading to nearest figure). Number of cuts equals total stock removal divided by increase in diameter per cut, or 1 ÷ ¾ = 3 cuts. The column "Approximate depth of cut" is useful in further calculations of machining time.



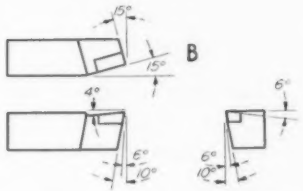
Boring-Tool Design for Turret-Lathe Operations

FOR CAST IRON AND BRONZE

Tools *A* and *B* are alike, except for end-cutting edge angles of 23° and 15°, and secondary front clearance angles of 18° and 10°. These tools are designed for use in holes of different diameter, prevent dragging, as tabulated. Also, tool *A* is used in a bar arranged to bore holes that do not go clear through the work.



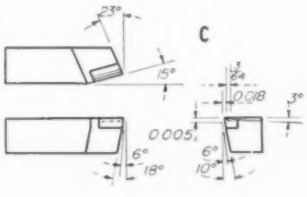
TOOL A	SMALLEST BORE
3/8 IN SQ	1 9/16 IN
1/2 IN SQ	2 7/8 IN
3/4 IN SQ	3 1/8 IN

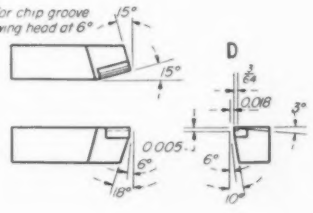


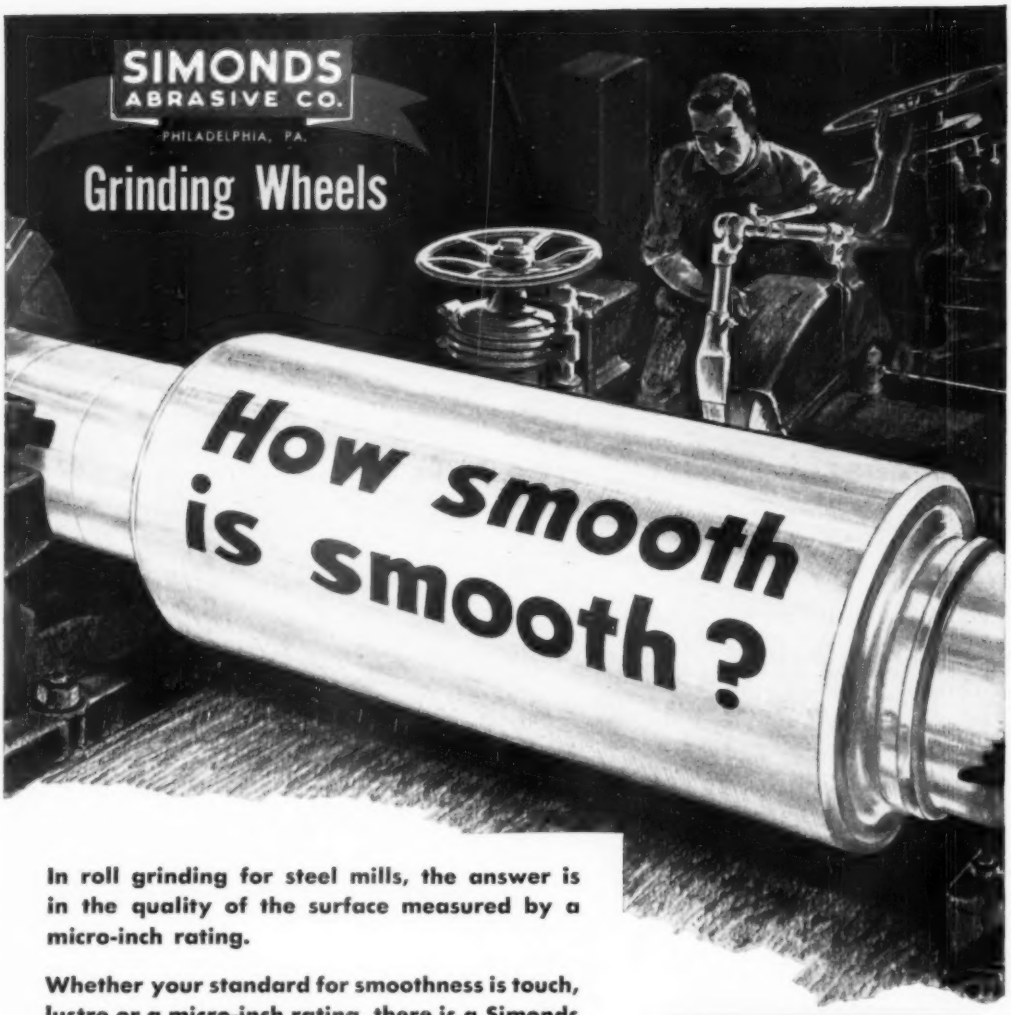
TOOL B	SMALLEST BORE
3/8 IN SQ	2 5/8 IN
1/2 IN SQ	3 5/8 IN
3/4 IN SQ	5 1/8 IN

FOR STEEL

Tools *C* and *D* have zero back rake and a chip breaker 0.005 in. deep, and are otherwise the same as Tools *A* and *B*. The combination of zero back rake and a chip breaker has been found to produce satisfactory boring of steel and proper control of chips. Further, these features reduce the grinding time and also extend tool life, because a minimum of carbide is removed.



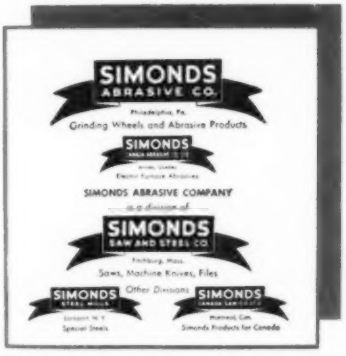




In roll grinding for steel mills, the answer is in the quality of the surface measured by a micro-inch rating.

Whether your standard for smoothness is touch, lustre or a micro-inch rating, there is a Simonds Abrasive wheel which is right . . . right in grain, grade, bond, size and shape . . . right in smooth operating efficiency reflected in long grinding action, quality output, better results per wheel dollar.

Your nearby Simonds Abrasive distributor is part of a smooth functioning distributor set-up in leading industrial centers. Let's send you his name and a copy of our Data Book describing Simonds Abrasive Company's complete line.



SIMONDS ABRASIVE COMPANY, PHILADELPHIA 37, PA. DISTRIBUTORS IN PRINCIPAL CITIES

TALKING SHOP

Training

WHAT ARE WE GOING TO DO with the likely young men, who have the makings of good mechanics and possibly foremen and supervisors? Small-plant executives are too hard-pressed for time to develop these men. Should training classes be established on a community basis to provide the "book learning"?

Looming Problem

SHUTTLES are the principal headache in modern looms. Made of wood, they wear rapidly, may splinter and cause trouble, particularly in weaving synthetic fibers such as rayon and nylon. Magnesium has been successfully applied to many loom parts and American Magnesium Corp. has been experimenting with magnesium shuttles. They work fine in the laboratory, but as soon as they are installed in a plant they fail in about ten hours. Lab test looms are relatively new, properly maintained, with correct adjustments maintained. Apparently no manufacturer can make this claim for production looms.

Incidentally, wood shuttles are made in a special machine. You stick in a block of wood, the cutters whirr, and out pops a completed shuttle. AMC temporarily forgot about prescribed tool angles, speeds, feeds, and other special instructions, stuck in a block of magnesium. The cutters whirred and out popped a completed shuttle.

Mixed Forecast

"DEPENDING ON how your own business is behaving, this country either faces a depression, a recession, a normal competitive era, or the brightest future in all its history."—The Houghton Line.

Too Hot

BELL AIRCRAFT, developing the X-2, a far speedier version of the X-1, will finish it with stainless steel on fuselage and sweptback wing. The X-1 is surfaced with heavy-gage dural. But even this special dural begins to lose strength at 250 F, and a plane flying at twice the speed of sound at 35,000 ft would have a skin temperature of 267 F, at triple sonic speed, 640 F. The pilot will have to be refrigerated.

No Dog Ears

SEARCH FOR STEELS that won't dog-ear when formed into a catsup-bottle cap led U. S. Steel researchers into a development that interests makers of auto fenders and bodies, washing-machine tubs, cooking pots, and transformers. They found an inherent magnetic property can be measured and determines how formable the steel is. This property is measured with a recording torque magnetometer developed by Donald S. Miller. It plots a magnetic torque curve for any steel in 6 min. Deep-drawing steels must have minimum magnetic directional properties (little difference between properties with and against the grain) while a good transformer steel must have maximum directional qualities.

The magnetometer is already in use in various of the company's mills.

Daffynitions

WAITER—fellow who thinks money grows on trays . . . BALD-HEADED MAN—one who wears his hair departed in the middle . . . CRYING DRUNK—tearful beerful . . . CHIMNEY SWEEP . . . man with a dark outlook . . . SCOTSMAN—man who knows who's wearing the skirts in his family . . . SCANDAL—something that must be bad to be good . . . SUGAR DADDY—crystallized sap . . . CONSULTING PHYSICIAN—doctor called in at the last minute to share the blame (for a price) . . . FASHION—ugliness so intolerable it must be changed semi-annually . . . JOINT CHECKING ACCOUNT . . . where a wife beats her husband to the draw . . . NEWS—the stuff that affects you when you hear it, not when it happens.

Glass Virtue

DR. ALBERT W. DAVISON, Owens-Corning Fiberglas Corp., was speaking at a meeting of the Engineering Society of Detroit. Asked a lady, "Will dresses be made of glass cloth?" Replied Dr. Davison, "There would be no virtue in a glass dress." The report is that he was surprised by the sudden amusement of his auditors, insisted no double entendre was entendred.

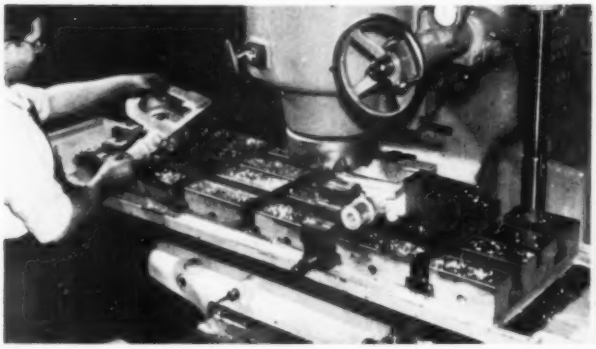
Comparison

A TYPICAL experimental jet-propelled medium bomber requires 6500 drawings for the airframe, 3000 for the power plant, and 18,000 for the armament, according to a recent Air Forces chart. That is beginning to rival the Navy's figures on battleship drawings, or the Army's carbons for any letter.

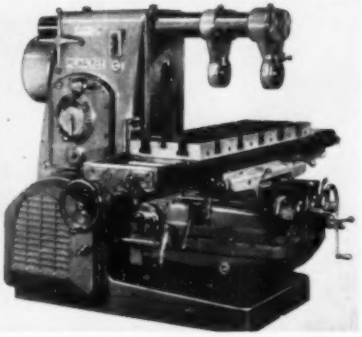
Bucket Mystery

WHEN TRACTOMOTIVE CORP. made its first excavating bucket of magnesium, the aim was to increase capacity by saving weight. It wasn't long before the contractor that bought it was on the phone wanting to replace the buckets on all his other shovels with magnesium ones. The weight saving was very nice, thank you, but that wasn't the biggest advantage. Seems that dirt doesn't stick to magnesium, eliminating one of the worst problems in handling moist or wet ground. This property of magnesium, which has been largely overlooked, was the source of a spirited discussion at the recent Magnesium Assn. meeting. They agreed that it had something to do with molecular attraction but couldn't pin it down further. Maybe the molecules have round tops.

New Shop Equipment



1 *Longitudinal T-slots are precision milled for positive alignment of jaw-bases and jacks. Center T-slot is standard to accommodate vises, rotary tables, other accessories*



2 *This plain miller is available with or without automatic-cycle mono-lever table control for feed and rapid traverse*

Built-In Chucking Table Eases Workholding

KNEE-TYPE milling machines incorporate a built-in chucking table for simplification of workholding problems. Machines handle irregularly shaped workpieces, without resorting to costly special tools and fixtures and utilize simplified vise jaws and standard setup accessories. The chucking table is cast in one piece and is precision made for accurate positioning of jaw bases and accessories.

Twenty-four chucking-table milling machines are available in plain or vertical styles, with or without automatic-cycle mono-lever table control, in two sizes—No. 4 and 5, having 42- and 50-in. table travel, respectively. Power capacities range from 20 to 50 hp.

A deep-well coolant drain provides clean return and is said to keep area free from oil and coolant-borne chips. Self-cleaning stop holes are accurately bored, ready for bumper stops when setup requires. Operator's tool space is cast into the machine table at both ends for hand tools and small setup accessories. Five traverse T-slots are spaced for maximum workholding capacity within the range of the table. The Mono-lever table control for feed and rapid traverse simplifies machine operation and is a standard feature on automatic-cycle machines.

Chucking-table accessories include the master jaw bases, consisting of two large T-nut units connected by a right- and left-hand screw. These bases fit both the longitudinal and transverse table T-slots.

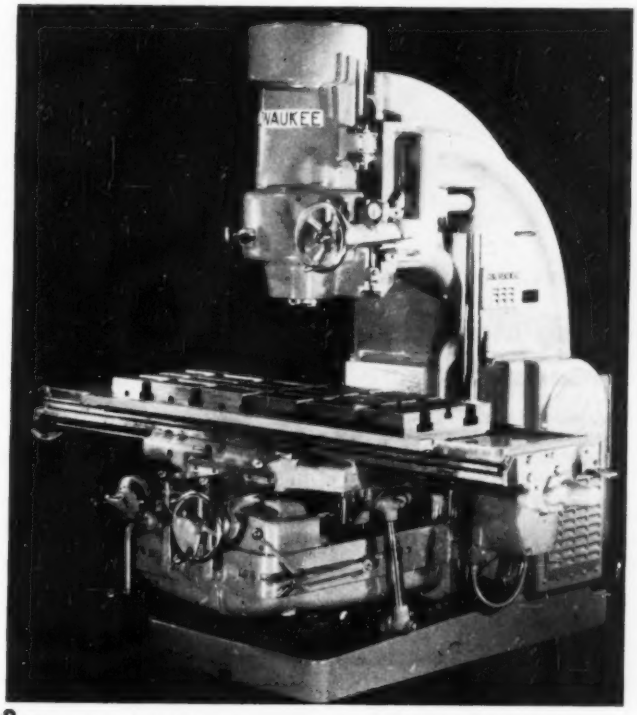
Three types of vise jaws are mounted on the master jaw bases to form the chucking mechanism: 1) Smooth universal reversible jaws have three gripping surfaces. This type is most suitable for operations which are located from finished surfaces. 2) Serrated universal reversible jaws have three curved gripping surfaces—two on one side, one on the other. These are suitable for rough and finished

Air-Powered Pipe Saw Cuts 12- to 48-in. Dia CI or Steel Pipe

HSS milling cutters leave clean milled edges on 12- to 48-in. CI or steel pipe cut with this portable air-powered machine. Only guide rollers and two travel-chains need be adjusted for size. Unit weighs 265 lb., can be set up by two men in 15 min. Pipe can either be rolled on skids or unit can travel around it; 14-in. clearance being required. Saw mechanism is sealed so unit can cut under water. Cut is made in one rotation. Two silent chains hold unit to pipe, compensate for surface irregularities and provide "ring gear" for feed.

The E. H. Wachs Co., 1525 N. Dayton St., Chicago 22, Ill.

Materials and Parts

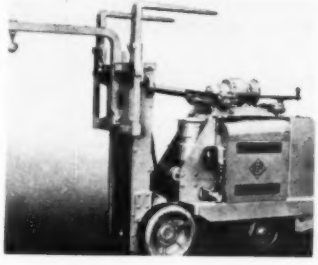


3 *This vertical style 50-hp No. 5CSM machine is one of 24 chucking types available*

castings. 3) Vise jaw blanks, rectangular in shape, can be machined to meet specific job requirements. Other workholding and locating accessories are available.

Kearney & Trecker Corporation, Milwaukee, Wisconsin.

Fork and Boom Interchangeable In One Attachment



This truck attachment provides fork and boom in one unit. It is useful where loads are heavy and vary in shape and size. The device has three main parts: a base member which is attached to the truck's lifting mechanism and which rides in the upright tilting columns; the fork tines suspended from a bar supported on the base; and the boom.

That part which engages the base is machined for a sliding fit into brackets and a base socket. When forks are to be used alone, the boom is detached. When boom is required by itself the fork tines are swung up and back and held in this reversed position by means of pins in brackets at top of the back-base. The boom in the model illustrated extends 36 in. horizontally from base. Maximum height of fork is 117 in. Truck's rated capacity is 4000 lb.

The Elwell-Parker Electric Co., Cleveland, Ohio

...INCLUDING

Air-powered pipe saw cuts 12- to 48-in. dia cast iron, steel—in one rotation ..... page 134

Thread roller incorporating automatic hopper feed produces 12 to 150 pieces per min...page 148

Honing machine for small-diameter parts holds tolerances to millionths .....page 136

Hydraulic automatic lathe for large parts swings 35½ in over bed .....page 137

Finish milling and centering of both ends of work done simultaneously .....page 138

Horizontal boring, drilling and milling machine, equipped with automatic power positioning, allows repetition of spacing operations .....page 140

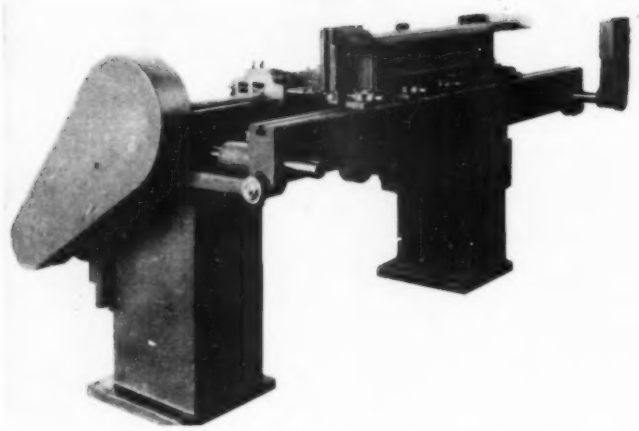
Mist-type coolant circulating unit attachable to tool grinders .....page 142

...and in June 30

Automatic quill-type horizontal honing machine holds size of valve guides within 0.0003 in. on diameter.

Engine, toolroom lathes have 16 spindle speeds — optional speed ranges for low or high speeds.

Single-spindle automatic chucking machine with front, rear cross-slides, has a 5-faced overhead turret.



Moline Horizontal Drilling Machine Handles One Slat Per Machine Cycle

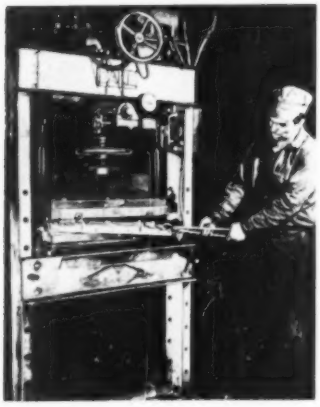
Special drilling machine, Model SLD400, for slat drilling is an adaption of the Moline spiral drive for in-line spindles to the drilling and counterboring of wooden slats. These slats are used on canvas conveyor belts for harvesting equipment. Holes are drilled for rivets. The machine also can be adapted to drilling of steel or aluminum strips having dimensions comparable to wooden slats.

The machine consists principally of a rail carrying six horizontal in-line drill spindles and a magazine-type work-holding device which presents one slat to the drills per machine cycle. Slats of several lengths are handled. Work-holding magazine is adjustable. Maximum adjustment will accommodate slats 59 in. long. Adjustment of the in-line drill spindles for the various center distances allow setting up the machine for different types of slats or for various numbers of drills.

When the machine is in operation, the drills rotate continuously, but have no feed travel. The feed mechanism is actuated by a crank motion driven by a small motor, to produce reciprocating action. The machine drills and counterbores from 1000 to 1400 slats per hr., depending on quality and uniformity of material.

Moline Tool Co., Moline, Ill.

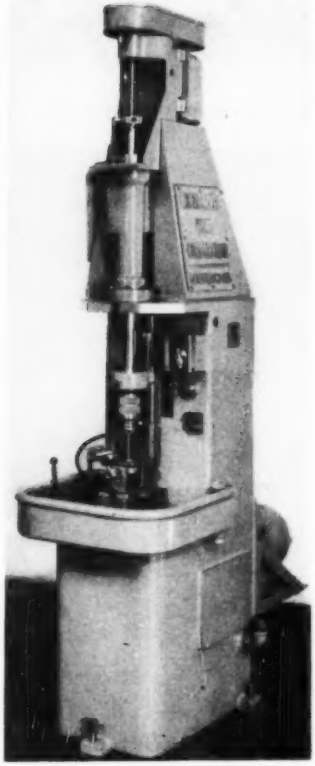
Dake Press Straightens Castings Prior to Machining



Simplification of straightening of iron castings prior to machining, reducing distortion losses, is possible with the 50 HE Elec-Draulic Press equipped with special straightening dies. Distorted castings are placed in the press immediately after their removal from the normalizing furnace.

Press has a production capacity of 400 castings per day, averaging 1.6 min per casting. A quick-acting release valve eliminates time-consuming turning on and off of motor for each pressing operation. Other features include adjustable safety valves to protect against overload and a variable-speed ram.

Dake Engine Company, Grand Haven, Mich.



Micromatic Hydrohoner Finishes Small-Diameter Parts

Featuring sensitive controls and simplicity of operation, the Model 735 Hydrohoner handles small-diameter parts. Tolerances to millionths of an inch are held, reducing the number of operations and selective fits on parts such as diesel injectors. Machine is shown finishing a part with a hardness of 45 Rockwell C. Size is held to 0.0001 in. on the diameter. Geometrical accuracy is held to 0.000025 in. Surface finish is 2 to 4 micro in. rms.

Micromatic Hone Corp., Detroit, Mich.

Improved Excel Cutting Oil for Stainless, Chrome-Nickel Alloys

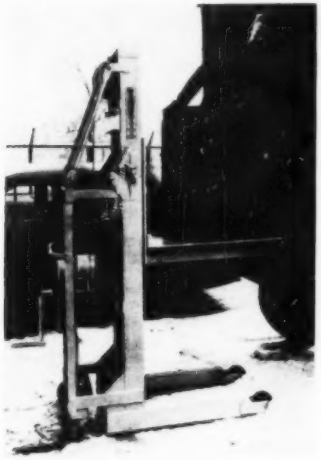
Excel No. 60 is offered as an improved high-sulfur ester cutting oil stable under all operating conditions involving the machining of stainless steel, all series, as well as chrome-nickel alloys and monel.

Oil Products Co. Inc., 4111 So. La Salle St., Chicago 9, Ill.

Improved Grease, Oil Remover Emulsifies with Water

READI-SOL is an all-purpose metal cleaner that can be used either as a spray or painted with a brush. The cleaning fluid removes grease and oil from cement floors, as it emulsifies with water. READI-SOL is non-toxic and will not affect the metal in any way.

Preventive Maintenance Co., 1997 Fairfield Ave., Bridgeport, Conn.

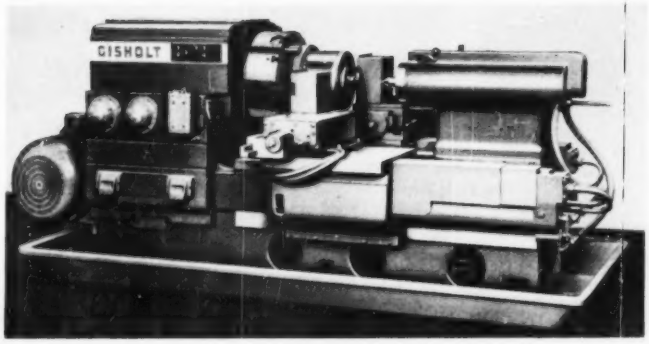


Hand-Operated Elevators Handle 500-, 1000-, 2000-lb Loads

Capacities of 500, 1000 and 2000 lb are offered in the new Hundred line of Barrett hand-operated portable elevators. These three general-purpose elevators can be used for die handling, servicing balconies, overhead repairs, and motor-truck loading. Baby of the line is the 5-Hundred, an improved version of the Barrett all-purpose elevator. The new hoist is more efficient than the worm-gear unit formerly employed. Lifting effort in cranking the machine is said to be considerably less.

Over-all height is 6 ft, lift 5 ft. Platform is 24 in. square. The 10-Hundred elevator with a 1000-lb capacity offers a hand mechanism with two speeds up and governor down. Over-all height is 8 ft; lift, 6 ft 4 in.; hinge height, 5 ft 6 in.; platform, 24x30 in. The 20-Hundred model with a 2000-lb capacity is a heavy-duty elevator. Over-all height is 8 ft; lift, 5 ft 8 in.; hinge height, 5 ft 6 in.; platform, 24x36 in. Elevators have all-welded construction.

Barrett-Cravens Co., 4609 S. Western Blvd., Chicago 9, Ill.



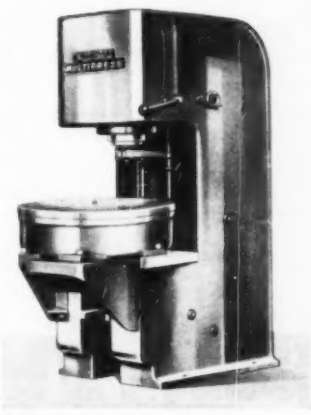
Gisholt Hydraulic Automatic Lathe For Production of Large Parts

This No. 24 hydraulic automatic lathe is for heavy-duty work and swings 35½ in. over the bed ways. It embodies many of the basic principles of the Gisholt No. 12 hydraulic automatic lathe. Standard equipment consists of front and rear carriages, each with its own auxiliary slide.

Each slide has its own feed pump and controls, and can be mounted to traverse and feed at any angle to the spindle centerline. Spindle speeds are selected by pickoff gears and starting and stopping of spindle is part of the automatic cycle. Setup is simplified by hydraulic controls which permit the operator to make the slides run separately, stop at any point, back up or continue the cycle.

Swing between centers is 36 in. Standard chuck sizes are 15-32 in. Thirty-two possible speed combinations within each range are offered. The independent slide has a 15-in. travel. Standard carriage front and rear has a 24-in. travel. Floor space required is 62x160 in. The hydraulically operated tailstock offers 10 in. of movement with adjustable pressure. Width across ways is 28 in.

Gisholt Machine Co., Madison 10, Wis.



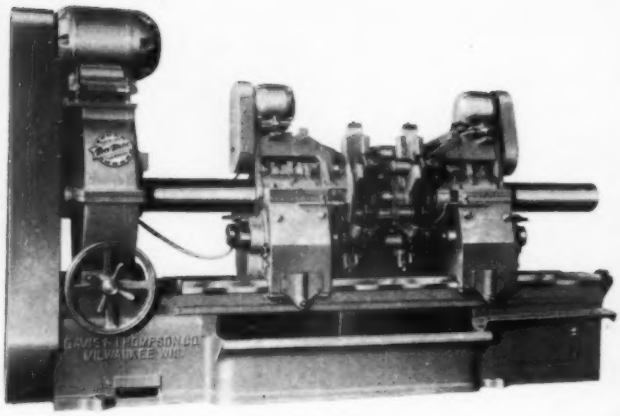
25-Ton Oil-Hydraulic Press Has a 15-in. Stroke

Speed and control advantages are offered in the high-production, 25-ton oil-hydraulic press. The Multi-press has a 15-in. stroke, 25-in. daylight opening and 12-in. throat depth. Approach of ram to work is variable and can be preset at desired speed to 530 rpm.

Other operational factors that can be preset include ram-stroke length, pressing speed, and ram pressure. Press can be equipped with a choice of controls including dual lever, single lever, pedal, or electric pushbutton type. It also can be operated with automatic valve control for single cycling, continuous cycling or vibratory repeat strokes. Automatic ram cycling also can be used in conjunction with variable-speed approach, adjustable pressures, and interlocking hydraulic accessories.

The Denison table accessory moves parts under the press ram automatically and provides indexing for either 6 or 12 stations. Provision is made for skipping non-tooled stations on the index table.

Denison Engineering Co., 1160 Dublin Rd., Columbus 16, Ohio

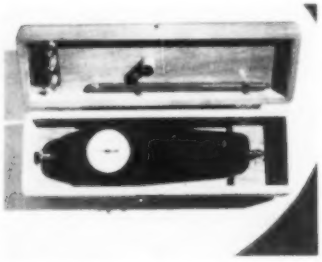


Milling, Centering Machine Operates On the Continuous Rotary Principle

Type MAC milling and centering machine permits finish milling and centering of work simultaneously on both ends. Sizes of pieces determine the number of stations in the rotary drum-type fixture. During the machine cycle each station of the fixture picks up the centering heads. While they are being carried upward the centering spindles are fed into the work by stationary cams to produce a center of predetermined depth, retracted and released.

Centering heads are returned to their low position by gravity. Shock produced by lowering heads is absorbed by air cylinders acting as dash pots. Work varying in length from 12 to 45 in. can be accommodated. Special-length beds can be provided for extra-length work. When six-station fixtures are used, work up to 4 in. in diameter can be taken. Using a cutting speed of 10 ipm, a production of 50 pieces per hr can be obtained. Where eight-station fixtures are provided, work to 2½ in. in diameter can be run. A production of 65 pieces per hr is obtained with a 10-ipm cutting speed. Fixtures are of the automatic-centering type using a right- and left-hand screw with two V jaws. Automatic clamping is adaptable where smaller parts are run—practical when pieces are run on a production basis.

Davis and Thompson Co., 6411 W. Burnham St., Milwaukee 14, Wis.



Portable Force Indicator Utilizes Precision Spring System

This Force Indicator utilizes a precision compensator spring system to give force measurements accurate to ½ graduation or ½ of 1% at full scale of the dial indicator. The spring system is composed of three groups: the main compression spring, the compensating extension spring, and the load-transmission rod-centering springs and springs internal to the dial indicator.

Force is applied to the system through a load-transmission rod. Movement of this rod deflects the compensated spring system. This deflection is measured by a low-friction dial indicator. The instrument is shaped for one-hand operation. Fixed stainless-steel force transmission-rod fittings give the instrument a wide range of usefulness. Attachments include a simple thrust button, a pulling hook, a conical point-force applicator, a V-notch thrustfitting for lateral rod pressures, a chisel fitting for re-entrant edges and notches, and a 6-in. extension rod. Unit available has a 10-lb capacity. Accurate force indications (spring gradient) are possible because relationship between force and spring displacement is linear throughout the dial range.

Hunter Spring Co., Lansdale, Pa.

4-Way Air Control Valve Operates Two Double-Acting Air Cylinders

This three-position, double, four-way air valve is introduced for operating two double-acting air cylinders. Listed as the Logan Model No. 50, it is of packless plug-type construction. The brass taper plug is precision ground and lapped into a high-tensile cast-iron body, giving a perfect seal. Made for foot mounting on any flat surface, it can be located anywhere on the machine with the operating handle in a vertical or horizontal position.

All working parts may be removed without disconnecting air pipelines. Two cylinder ports and one exhaust port are grouped on one side of the valve with two cylinder ports and one intake port on the opposite side. All six ports are tapped for ¼-in. pipe.

Logansport Machine Co., Inc., Logansport, Ind.

Swivel Joint Suitable For 400-psi Max Pressure

This swivel joint called "Swivlex" is suitable for 400-psi max pressure and 600-F max temperature. The easy swivel is due to an internal equalizing chamber which balances the pressures on both sides of the swivel seat. The all-metal construction eliminates packing. Stainless-steel bellows act as seep-proof, self-adjusting springs that constantly keep the metal-to-metal seat under pre-adjusted pressure to prevent leakage. Standard sizes are available up to 1-in. ID.

Seamless Co. Inc., 41-25 - 25th St., Long Island City, N. Y.

Boat-builders launch DOUBLE PROFITS...
both in production and sales

. . . when AMERICAN PHILLIPS SCREWS "come aboard"

SMOOTH SAILING IN PRODUCTION: Boats almost build themselves . . . with the handling ease, driving speed, and non-slash protection of American Phillips Screws. Every fastening is clean and shipshape . . . *turned up flush, to stay.* And every American Phillips fastening *takes only half as long* as an old-fashioned slotted screw. So costs are really keelhauled!

SMOOTH SAILING IN SALES: From boats to bamboo bars, the American Phillips universal cross-recess enables manufacturers to put new decorative values, new sales appeal into their products. For American Phillips fastenings say "Modern Quality" so plainly that many manufacturers find it mighty good business to merchandise: "American Phillips Construction." How about *you?*

4-WINGED DRIVER CAN'T SLIP OUT OF PHILLIPS TAPERED RECESS

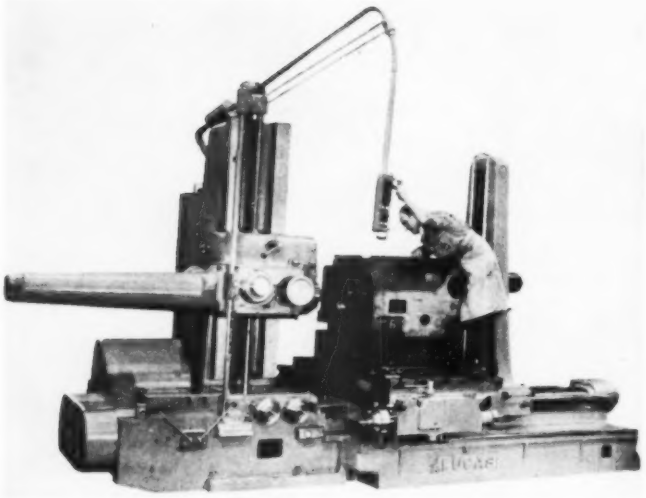
AMERICAN SCREW COMPANY, PROVIDENCE 1, RHODE ISLAND

Chicago 11: 589 E. Illinois St. *Detroit 2:* 502 Stephenson Building

AMERICAN PHILLIPS *Screws*

ALL TYPES

ALL METALS: Steel, Brass, Bronze, Stainless Steel, Aluminum, Monel, Everdur (silicon bronze)



Lucas Precision Machines Built In 3-, 4-, 5- and 6-in. Spindle Sizes

The Lucas Precision horizontal boring, drilling and milling machine is built in 3-, 4-, 5- and 6-in. spindle sizes in both electrically and mechanically controlled models. The machines are equipped with automatic power positioning for both table and head allowing the operator, using dial indicators, to repeat on spacing operations, either horizontally or vertically, doing away with jigs or fixtures.

These mills have one spindle with both high and low speeds. On high-speed work this spindle is directly driven by V-belts and all vibrations are dampened by the flywheel action of the by-pass low-speed gears. Pendant control on 3- and 4-in. spindle machines start, stop, jog and reverse the spindle rotation. The 4-in. spindle model 460, and 5-in. and 6-in. spindle machines are equipped with pendant directional control for spindle rotation, feed and rapid-traverse selection for movement of any unit.

Work ranges of 36x36 to 94x84 in. are covered by the line. Speed ranges are from 7½ to 850 rpm on the 5- and 6-in. machines, to 13½ to 1500 rpm on the 3-in. machine, with special speeds available on request. Angular and vertical milling attachments, combination boring and facing heads, and power- and manually operated swiveling tables are offered as accessories.

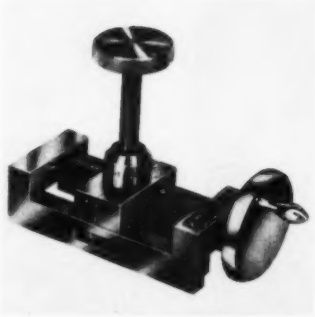
Lucas Machine Div., New Britain Machine Co., Cleveland, Ohio

Keystone Rivetless Chain Assembled Without Use of Tools

This improved type of Keystone rivetless chain, X-458, is assembled or disassembled without use of any tools. It has no rivets, welds or bolts, and requires no special or joining links and may be discontinued at any point. Chain is said not to become disconnected or telescope in service.

The open structure of the chain, together with the fact that the center link on pin bearing area is in direction of load only, makes this chain exceptionally serviceable in corrosive or dirty conditions. It is said to be impossible for the pins to freeze — the chain remains flexible. The side link has a new type of web which stiffens the link. X-458 is interchangeable with standard 458 4-in. pitch chain. All parts of the chain are drop forged from high-carbon steel, having a tensile strength of 85,000 to 95,000 lb.

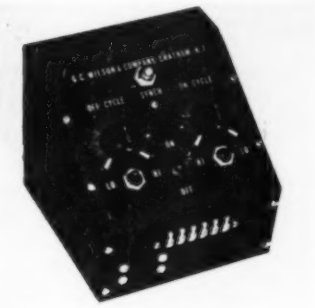
The Jervis B. Webb Co., 8951 Alpine Ave., Detroit 4, Mich.



Model A Matco Wheel Dresser Permits Dressing While Grinding

This Model A Wheel Dresser for surface grinders is designed to dress wheels from 1⅜ to 4¼ in. wide. It eliminates stopping the machine, removing work from chuck, lowering and raising wheel head. Operator is able to dress the wheel while grinding.

Matco Tool Co., 2834 West Lake St., Chicago 12, Ill.



Repeat-Cycle Timer Employs Radio-Type Vacuum Tube

This repeat-cycle timer is an electronic device employing one radio-type vacuum tube. It obtains its timing intervals by the charging of two resistance-capacitance networks. One cycle initiates the next cycle without any moving parts or external operations. The on and off cycles are infinitely variable over the ranges specified.

Time intervals are on, 0.2 to 200 sec; off, 0.1 to 60 sec. Power supply is 105-120 volts, 60 cycle (dc timers also available). The steel cabinet is 6x6x5 in. with a sloping front. Since the standard relay provides two makes and two breaks, the intervals above are interchangeable.

G. C. Wilson & Co., 2 N. Passaic Ave., Chatham, N. J.

Solid Brass combined with steel and aluminum in this quality lock set

Sargent Pin Tumbler Door Lock, in the 4500 Line of Precision-Built Lock Sets. Includes locking button in center of inside knob, and automatic deadlock. Made by Sargent & Company, New Haven, Conn.

Parts of the Sargent 4500 Line Lock Set. All exposed and most working parts are solid brass. Other metals include seamless steel tube, pressure-cast aluminum, steel springs and lock washers. Steel parts are rust-proofed.

It is a fixed policy of Revere, expressed through its Technical Advisory Service, to recommend the most suitable materials for each application, whether or not supplied by Revere. An outstanding example of this practice is to be seen in the Sargent 4500 line of Precision-Built Lock Sets, a new line of exceptional beauty, security, convenience and long life. Revere and Sargent collaborated closely on this and other Sargent products.

The lock sets have a number of important advantages. One is the self-aligning feature; there is an aligning tube of pressure-cast aluminum which makes it independent of the door for proper functioning. The case is a seamless steel tube, copper brazed to the front support plate. The solid brass lock mechanism has been simplified to achieve a small cross bore, permitting gracefully-designed knobs and roses in the proper proportions. The roses, incidentally, are applied without the usual screws, and there is no set screw in the knob. A new principle permits the knobs to project the same distance on each side, regardless of door thickness. The lock set is available in five different functions, each requiring the same size holes in the door, for the economy of standardized installation.

All exposed parts are brass as are many of the other parts—solid brass, the quality metal that assures permanent service and good looks in hardware. Revere is proud to be an important supplier of fine brass in the hardware industry, as well as to manufacturers generally . . . The Technical Advisory Service is always at your service, ready to give unbiased suggestions on materials, design and fabrication.

REVERE

COPPER AND BRASS INCORPORATED

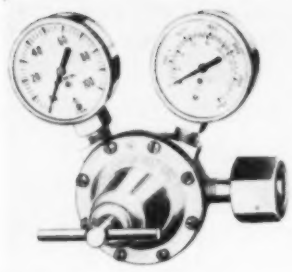
Founded by Paul Revere in 1801

230 Park Avenue, New York 17, New York

• • •

Mills: Baltimore, Md.; Chicago, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N. Y.

Sales Offices in Principal Cities, Distributors Everywhere.



Single-Stage Welding Regulators Offered for Oxygen and Acetylene

Single-stage welding regulators for oxygen and acetylene are said to equal the performance of most two-stage regulators. They are the yoke type for maximum safety and hold the secondary pressure while tank pressure falls. A ball-pivoting lower spring rest gives friction-free operation. O-rings are placed between yoke and diaphragm and between body and bonnet to seal and cushion the diaphragm. Each model is complete with primary and secondary pressure gages and standard tank connection.

C. A. Norgren Co., 222 Santa Fe Drive, Denver 9, Colorado

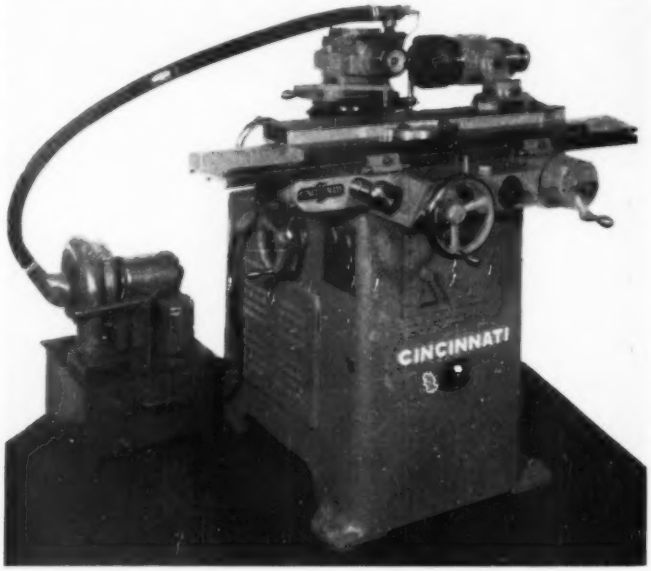
Precise Grinder-Miller Operates Mounted Wheels to 1¼-in. Dia

With a speed of 45,000 rpm and over 1/5-hp, the Precise Super 40 grinder-miller can be used with or without the Coolflex extension or in machine set-ups. It operates mounted wheels to 1¼ in. dia, unmounted wheels, cut-off wheels and metal saws with special arbors up to 2 in. dia by ¼ in. wide, using speed control, and HS Midget mills and carbide micro mills up to ⅜ in. dia and 1 in. wide.

A line of tools and accessories adapt the tools to almost any production setup in standard lathe, milling machine, drillpress or other stationary machine tool. Accessories include the Super Coolflex flexshaft extension, a tool mount, a universal mount, a line of lathe stands with built-in speed control and Magni-Ray unit for standard and special applications such as wire stripping and mica undercutting.

Used as a handtool or with the Coolflex attachment, the tool also produces mirror finishes (one micro inch and less) on dies and parts, using special diamond compounds. The tool offers increased rigidity and accuracy of quill and collet chuck. With a speed control, speed can be regulated within a range from 15,000 to 45,000 rpm. The air-cooled motor is a complete unit with armature and field assembly in a self-contained cartridge that slips into the housing.

Precise Products Co., 1828-30 Clark St., Racine, Wis.



Mist-Type Coolant Attachment Offered for Carbide Grinding

Mist-type coolant grinding attachment is introduced for the Cincinnati No. 2 cutter and tool grinder. It consists primarily of a floor unit composed of a coolant-tank pump, and suction fan, a large-diameter flexible return tube and a small-diameter supply tube to the grinding wheel, and a guard which completely surrounds all but the face of the wheel.

A thin stream of coolant is directed to the wheel. The rapidly rotating wheel transforms the coolant into a fine mist which is immediately returned via the suction tube to the coolant tank. Thus a small amount of coolant continually circulates on a non-stop round trip. The mist-type coolant grinding attachment offers the dual advantage of wet grinding and dry grinding. Since the only connection with the machine is the coolant guard, it can be applied to any Cincinnati No. 2 cutter and tool grinder. The aluminum wheel guard has been designed for either Type D 12 W, 3x⅞x½-in. or type D 11 W, 4x1¼x1¼-in. diamond wheels. Vitrified cup wheels of these same dimensions can be used. Guards for other sizes can be supplied upon request.

Cincinnati Milling and Grinding Machines, Inc., Cincinnati 9, Ohio

Boosts Welding Speeds 75% with "Manual Lincolnweld"

By EDW. F. ARNTZEN
Sales Engineer
A. C. Woods & Co., Rockford, Ill.

USE of the hidden arc welding process of the "Manual Lincolnweld" in the fabrication of machine tool weldments has increased our welding speeds three to six times over previous hand welding . . . has eliminated spatter cleaning, minimized joint preparation, and reduced distortion and cracking problems. These cost savings and product improvements contribute materially to the advantages already gained by the changeover of these parts to welded design.

In fabricating the weldment shown in Fig.1, we assemble and hold in place the various members by tack welding. The units are then sent to the welding floor for complete welding. Finish welds are made with the "Manual Lincolnweld" machine except at inaccessible places where hand welding is used. On parts such as this, we have increased welding speed 50% to 75% with "Manual Lincolnweld." All welds were made with a single pass, and very little distortion and no cracks were encountered.

To weld channels into box sections for press frames, we clamp the welding gun to a radiograph as shown in Fig. 2. Joints are $\frac{3}{8}$" thick, bevelled. The 45-inch single butt welds (one on each side of the box) are made at a speed of 25 inches per minute. Floor-to-floor time is 10 minutes, compared to 30 minutes for the former method.

The high speed of "Manual Lincolnwelding" reduces distortion and joint-cracking problems which were formerly encountered in large parts such as the base shown in Fig. 3.

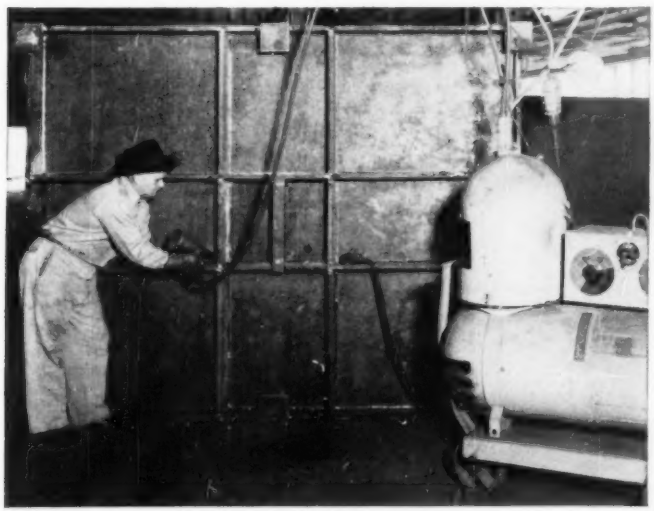


Fig. 1. "Manual Lincolnweld" fabricates this weldment at a speed of 50% to 75% higher than that of former method and eliminates cleaning.

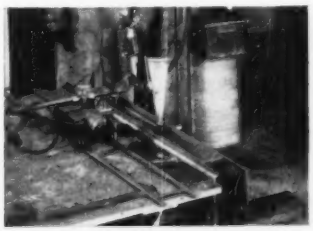


Fig. 2. Mounted on radiograph carriage, "Manual Lincolnweld" gun boosts output of these box sections 200%.

Fig. 3. Speedy, concentrated heat of "Manual Lincolnweld" reduces distortion and cracking problems in welding of parts such as this base.

The above is published by **THE LINCOLN ELECTRIC COMPANY** *in the interests of progress.*
Write for free copy of "Manual Lincolnweld," Bul. 373. The Lincoln Electric Company, Dept. 106, Cleveland 1, Ohio.

Sheffer Stock Pusher Utilizes One-Piece Insert

A one-piece insert replaces the separate segment pads employed in master pushers. The improved master stock pusher is offered for automatic screw machines—no pin screws, no parts to match up or get lost. No special wrenches or other devices are required for holding the single solid insert. Bearing surface for almost the entire length of the pusher assures a more secure grip with less tension and pressure on the stock. Greater capacity is also offered. Pusher can handle stock to full rated size because of elimination of protruding shoulders. It is available with inserts in file-hard steel, chrome-plated steel, nodular cast iron, high physical bronze, and nylon.

Sheffer Collet Co., Traverse City, Mich.

Liquid Stainless Steel Applied Like Paint

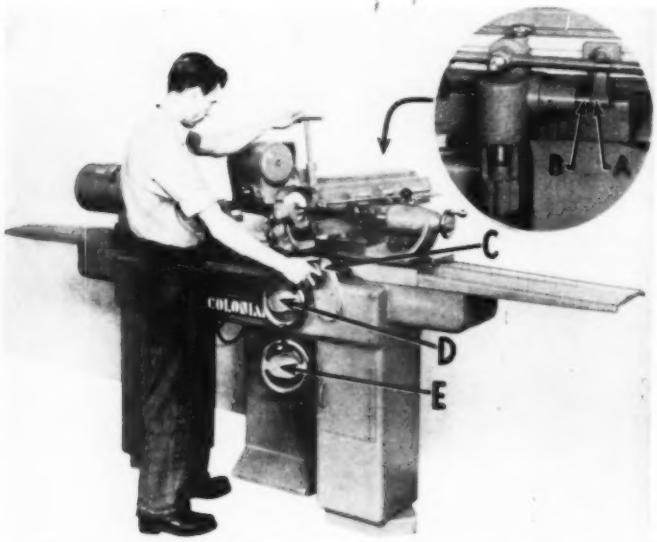
Liquid stainless steel can be applied to any surface by brushing or spraying. Stainless steel is broken down into flakes of microscopic size. It is so fine that it flows almost like a liquid. Material is incorporated in a liquid plastic with a solvent to bring it to brushing consistency. This product combines the advantages of stainless steel with the waterproof, chemical-proof and nonflammable qualities of the plastic.

The Lockrey Co., Plastics Div., College Point, N. Y.

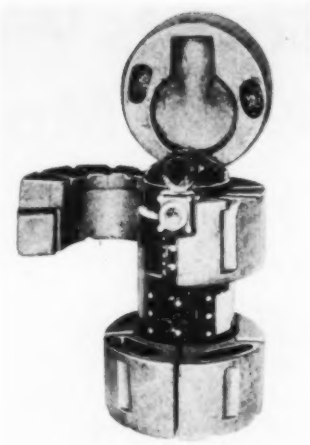
Drill and Countersink Set Includes Seven Sizes

This drill and countersink set consists of seven popular sizes with outside diameters ranging from ⅛ to 7/16 in. These KEO drills are made of 18-4-1 high-speed steel with ground flutes. Each set is packed in a finished hardwood box, with a separate compartment for each drill, and has a screw cap.

Keo Cutter, 19326 Woodward, Detroit 3, Mich.



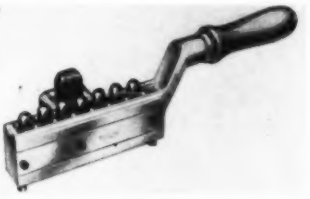
STEP-STOP MICRO-FEED cuts broach sharpening time 25%. Universal Broach Sharpener, Model No. CS-36 is designed for sharpening of both internal and surface broaches to 36 in. long and 6 in. dia. Micro-feed is composed of hand-wheel *C* which controls the setting of plunger *B* in the Step-Stop control. Bracket *A*, when it contacts the plunger, limits travel of wheel when using hand lever. Setting of bracket *A* for any broach is made with wheel at full depth on the largest-diameter tool on the broach and with plunger all the way out. To grind flat broaches, head and tailstock are replaced by magnetic chucks. Head movement for flat-broach sharpening is controlled by a second handle on head—*Colonial Broach Co., Detroit 13, Mich.*



Protective Packaging Medium Made of Molded Wood Pulp

This protective packaging medium is made of molded wood pulp. For square and rectangular items, standard corner pieces provide necessary protection. Shock cushions are placed into the four corners of the cradle carton and around the top. On quantity items material is especially molded to fit shapes other than square or rectangular.

Pulp Reproduction Company, Milwaukee, Wis.



Aluminum Marking Holder Adaptable to Heavy-Duty Work

This aluminum plate- and pipe-marking holder weighs 50% less than the former model. Adaptable to heavy-duty marking requirements, the holder incorporates the Cunningham friction retaining springs for quick change of steel stamps. They are designed with flat bottoms and replaceable metal feet enabling them to be carried along hot steel plates without damaging the stamps. Holders are made in any size or style, and for any size, number or combination of stamps.

The M. E. Cunningham Co., 95 East Carson St., Pittsburgh, Pa.

PRECISION HOLES Cost Less

with these LELAND-GIFFORD features

- Spindles individually driven by totally enclosed, fan cooled, ball bearing motors.
- Indicating Shift provides instant speed selection *without stopping machine.* Four standard speeds with four additional speeds available through back gearing.
- Six-splined, independently counterbalanced alloy steel spindles with preloaded radial-thrust bearings and continuous lubrication.
- Built-in light for each spindle completely illuminates work.
- Ratchet adjustment of sensitive hand feed lever.
- Box type ribbed table with platen machined to surface plate accuracy.
- Maximum rigidity insured by rugged construction of base, column and table.
- ★ Semi-Automatic Power Feed with three feed rates and positive, adjustable depth stop.
- ★ Plain or Step-by-Step hydraulic feed with infinitely adjustable feed rate and automatic overload release.
- ★ Reversing motor or high speed, ball bearing friction attachments for tapping at drilling speeds.

● *Indicates standard features* ★ *Optional extra features*

LELAND-GIFFORD
No. 2 LMS
Motor Spindle
Drilling Machine
Speed, Range, Accuracy . . .
a precision machine tool designed for low cost production drilling and tapping in the light to medium duty range. One to six spindles; 14", 20" or 26" swing; capacity of No. 2 Morse Taper.

PRODUCTION MEN
Get This Handy Slide Rule
A valuable aid in figuring costs and setting production schedules. Quickly gives time required to drill holes of any size and depth in any material. It's free. Write the nearest office.

LELAND-GIFFORD
Drilling Machines
WORCESTER 1, MASSACHUSETTS, U. S. A.

- CHICAGO 6, ILL. 565 W. Washington Blvd.
- DETROIT 26, MICH. 1533 Dime Bank Bldg.
- CLEVELAND 1, OHIO P. O. Box 5547
- NEWARK 2, N. J. Industrial Office Bldg.
- ROCHESTER 1, N.Y. Commerce Bldg.
- LOS ANGELES 14, CAL. 724 South Spring Street

Redesigned Roto-Clone Collects and Controls Dust

Used for the collection and control of dust generated in manufacturing and process operations, the Type N Roto-Clone has been redesigned to permit wider application and improved performance. The machine is a hydrostatic precipitator that cleans the air by the combined action of centrifugal force in a thorough intermixing of water and dust-laden air, reusing the water without recirculation pumps or spray nozzles.

The new design, with capacities through 48,000 cfm, maintains a lower pressure drop with the same cleaning efficiency and water recirculation rate and can be operated from 50 to 120% of its nominal rating without affecting its collecting efficiency. All sizes are available in either manual clean-out, sludge-ejector or hopper-bottom arrangement.

American Air Filter Co., Inc., 215 Central Ave., Louisville, Ky.

Weldit Torches Handle Atmospheric Air, and Propane or Acetylene

Torches designed to use atmospheric air and either propane or acetylene will find use among plumbers, electricians, painters, tinners and others. Torch C-48 has full Weldimatic trigger control, adjustable pilot light, and needle-valve adjustment. Torch C-48W is identical without the Weldimatic feature. Torch B-49 is a single-tube lightweight torch with needle-valve adjustment for acetylene and atmospheric air. Torch C-48B is a standard C-48 torch with heavy-duty extension and special burner for use with light portable tanks in removing paint from wood or metal surfaces.

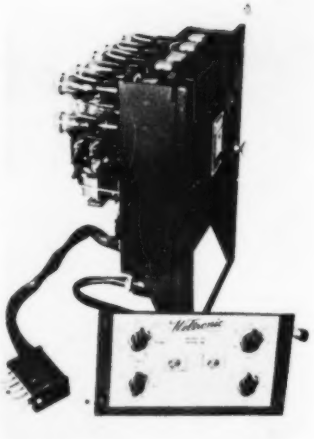
Weldit Inc., 990 Oakman Blvd., Detroit 6, Mich.

Quick-Opening Diehead Speeds Thread Cutting of Pipes

Over-all time for threading pipes, bolts and solid rounds is reduced with a quick-opening diehead featuring monotype high-speed steel chasers for long-life cutting service. The Peerless diehead can be used on any pipe-threading machine having capacity to 2-in. pipe diameter.

Suitable adaptors are furnished with dieheads for vertical or horizontal mounting on machine carriage. Interchangeability suggests different die heads for various pipe and bolt diameters. When in place the diehead is opened by means of a hand-operated toggle clamp, permitting rapid removal of stock after threading. Closing the clamp brings the chasers to accurate and positive cutting position. Monotype high-speed steel chasers are easily reground and reset. Single chasers are replaceable.

Peerless Machine Co., 1600 Junction Ave., Racine, Wis.



Sequence Weld Timers Available With 2050 Type Thyratron Tubes

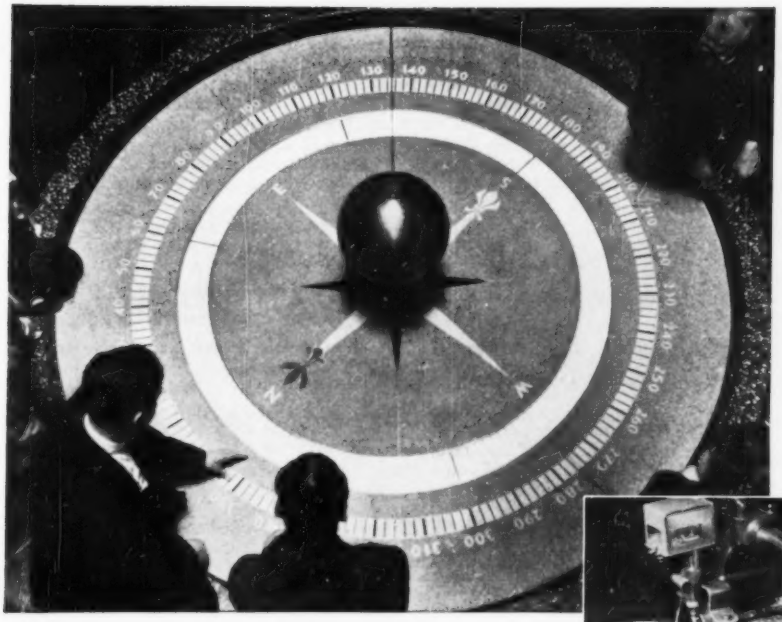
This model relay firing timer employs standard octal-base thyratron tubes and is designed for interchangeable front or side mount of timer dials when employed in a standard control combination. Timer panels incorporate the plug-in, swing-out construction. Timing periods are independently adjustable. Cabinet size is 18x16¾x12 in. deep. Illustrated is the NEMA 3B timer panel with control panel unfastened. Precharged timing capacitors insure accurate timing.

Weltronic Co., 19420 W. 8-Mile Road, Detroit 19, Mich.

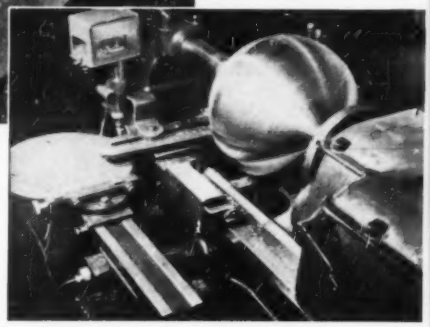
Hex-Uni-Key Combines Six Socket Screw Wrenches in One Tool

Hex-Uni-Key is six socket screw wrenches in one. This tool is small enough to carry in the pocket and consists of six sizes of setscrew wrenches anchored in a cast holder. Wrenches are hardened and heat-treated for long life. Wrench sizes are clearly marked on each size of the cast holder.

Eklind Tool & Mfg. Co., 2627 North Western Ave., Chicago 47, Ill.



Foucault Pendulum, Chicago Museum of Science & Industry.



Turning perfect hollow sphere for Foucault Pendulum on Monarch Tracer-Controlled Lathe, circa 1935.

"WE DID IT THEN... WE CAN DO IT AGAIN"

with a Monarch Tracer-Controlled Lathe

More than fourteen years ago, the Chicago Museum of Science and Industry came to us with a machining problem no other lathe builder had been able to solve.

We solved it.

What they wanted was a perfect, hollow, bell-bronze sphere, machined to the exacting tolerances required in astronomical physics—for use as a Foucault Pendulum, to demonstrate the earth's rotation.

The important thing is not that we could bore and turn a perfect sphere, with a maximum variation in wall thickness of only .001"—or that this same sphere is still on display—and that we can still turn spheres. (You may never need a perfect sphere in your business!)

But it *is* important to you that intricate, accurate contours can be turned on a lathe—and that we've been doing it for fourteen years—and more. Actually, we're now in our twentieth year of building tracer-controlled lathes; we pioneered the process. In that time we've built over 2000 such machines—an unequalled record of experience.

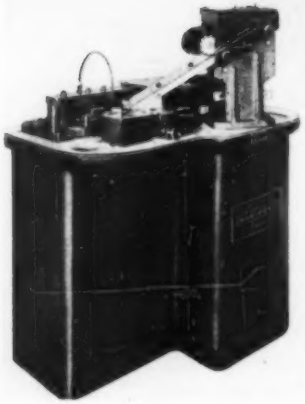
We have the experience and the only *complete* range of sizes and types of tracing mechanisms being built today. Put this combination to work in your plant for "*peak production at a profit*".

ACCURACY · ECONOMY · LONG LIFE

Monarch TURNING MACHINES

THE MONARCH MACHINE TOOL CO., Sidney, Ohio

FOR A GOOD TURN *FASTER* —— TURN TO MONARCH



Automatic Thread Roller Has Thread Length Capacity of ⅛ to ½ in.

This high-production thread roller, for machine-screw sizes from No. 2 to No. 10, will produce from 120 to 150 pieces per min. Thread length capacity is ⅛ to ½ in. The machine will roll threads on common screws, gimlet point and self-tapping drive screws, and can handle special applications.

The Model 190-H rolls Class 3 thread fits, limited only by the accuracy of the blanks. Dies used are the standard flat type. Die pockets are precision fitted, eliminating necessity for shimming and squaring. Dies can be adjusted while machine is running to control thread fits. Design incorporates an automatic hopper feed with notched clearing wheel, and a filtered lubrication system. The Hartford thread roller requires 4x5 ft of floor space, and is designed to keep work at a table-top level.

Hartford Special Machinery Co., Hartford 5, Conn.

High-Temperature Coated Fabric Resists Handling, Flexing

Plummite is a high-temperature coated fabric, durable enough to resist repeated handling and flexing. Plummite G-752 is offered for temperatures higher than 500 F. By applying a silver or aluminum foil to the material, heat reflection can be obtained. The material was originally developed for the jet-aircraft tail blanket program.

W. A. Plummer Mfg. Co., 752 S. San Pedro St., Los Angeles 14, Calif.

Kidde Smoke Detector Protects Against Industrial Fires

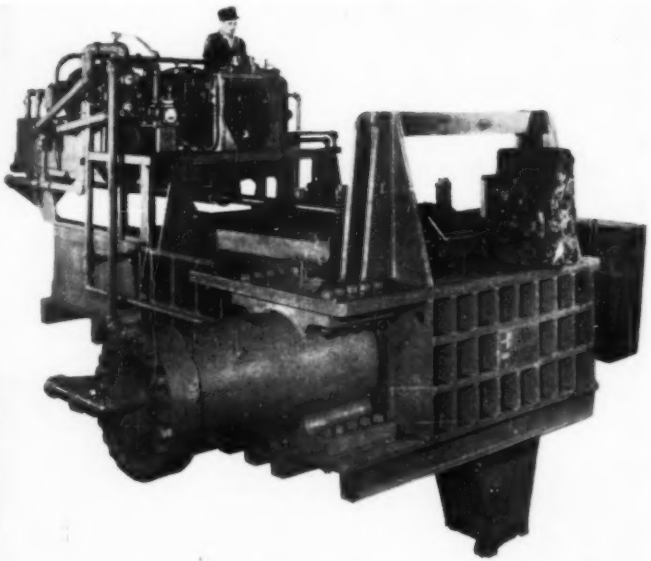
This single-unit photoelectric smoke indicator is for early detection of incipient fires in hazardous plant and warehouse areas. A continuous sample of air is drawn from the protected space through an individual piping system into an analyzer tube. In the analyzer tube, illustrated, the air sample passes through a filter screen to remove dust and dirt, then into a beam of light focused on a photoelectric cell. Smoke in the air sample cuts down the amount of light reaching the cell and sets off an alarm—connected to an electric circuit—to a control panel. The control panel not only transmits fire alarm, but also gives warning of mechanical and electrical disturbances in the apparatus, and is a useful adjunct to fire-extinguishing systems.

Walter Kidde & Co., Inc., 40 East 34th St., New York 16, N. Y.

Combined Loader, Carrier, Truck Operates at Speeds to 30 mph

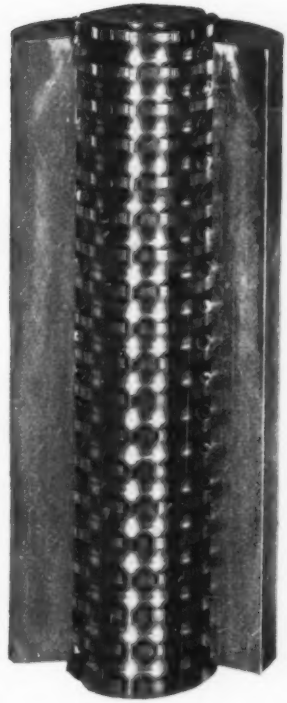
The low travel loader is a combination loader, carrier and motor truck. It self loads from the side onto the carrying deck and then transports its load through narrow aisles or over-the-road. The travel loader operates at speeds up to 30 mph. Three models are available; a 3000-lb, 10,000-lb, and a 30,000-lb lifting capacity. Featuring four-wheel drive, full hydraulic control, and hydraulic loader operation, the travel loader can handle heavy, lengthy materials.

Luce Mfg. Co., 3612 E. 44th St., Minneapolis 6, Minn.



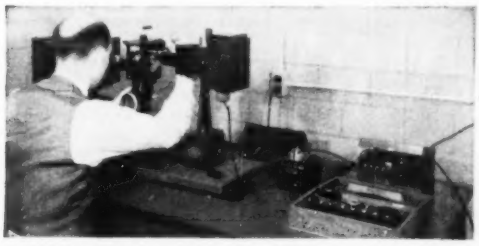
SCRAP-METAL BALING PRESSES turn out high-density bales of 600 to 750 lb each at the approximate rate of 7.5 tons per hr. The machine requires floor space 24x22 ft wide. Total weight is 116,000 lb. The Dempster Balester Type D, Model 600 S-1 high-speed scrap metal baling press offers two 75-hp electric motors. Hydraulic equipment features Vickers pumps and control valves. Charging box is 100x58x35 in. with the door closed, delivering a finished bale 16x18x35 in. Press is equipped with a new box-type ejector—*Dempster Brothers, Inc., Knoxville, Tenn.*

What makes a broach GOOD?



Typical of Colonial's continuous research on chip characteristics and the effect of various factors such as material, pitch, breaker spacing, etc., is this study on "deep hole" spline broaching.

At right, index and spacing checker for spline or serration broaches. Also checks lead. In front, special surface plate to check alignment. Note comparator in background for checking complex contours on broached samples.



Metallographic analysis of heat-treated specimens (taken at different radii on large broaches), precedes fabrication.

A complete chemical and physical lab provides facilities for metal analysis. Operated by trained technicians.

Test pieces produced during the grinding of involute splines on broaches are checked on this Michigan Tool involute checker.

A **GOOD** broach is about the most inexpensive tool you can buy—based on the number of finished pieces which it will produce. On the same basis, a poor or mediocre broach can be a costly investment, no matter what you pay for it.

Colonial's ability to consistently design and produce **GOOD** broaches is no accident. It is a matter of constant vigilance—checking and re-checking at every stage—plus the finest of inspection "tools". Here are some of the facilities that make Colonial broaches **GOOD** broaches.

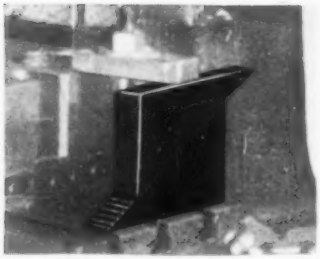
For the name of Colonial's representative in your area, write (Box 37, Harper Sta.), wire, or phone (LA. 7-1600) today.

PIONEERS OF H.S.S. BROACHING

COLONIAL

BROACH CO. DETROIT 13

Colonial Makes **GOOD** *Broaches*



Clamp Support Blocks Adjust in Increments of 1/16 in.

Clamp support blocks are offered for toolrooms and machine shops in 1/16-in. increments of adjustment for height in both vertical and horizontal positions. Range is from ½ to 10 in. in height, with one set of blocks. Hardened-steel positive slip-proof interlocking serrations and true flat bearing surfaces give assurance of safety.

Podlin Tool Co., 3920 Wesley Terrace, Schiller Park, Ill.

Ospho Metal Primer Applied Directly Over Rusted Surfaces

Ospho, a metal primer, is applied directly over rusted surfaces. It is a balanced formula of orthophosphoric, dichromate, extenders, and wetting agents. When applied it causes iron oxide (rust) to change chemically to iron phosphate, an inert, hard, dark-gray substance.

After drying overnight, rust is stopped and paint adheres so that moisture and oxygen cannot attack the metal. The metal primer cuts preparation time because rust does not have to be removed. It is water thin, is said to cover a larger area than paint, and can be used for interior or exterior work. One gallon is priced at $3. The paint can be applied directly on treated rusted surfaces when dry.

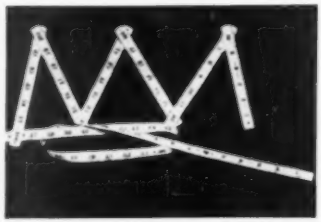
Rusticide Products Co., Cleveland, Ohio

Coatingage Measures Thickness of Non-Magnetic Coatings on Steel

The Coatingage is an instrument for measuring the thickness of nonmagnetic coatings on iron or steel. Measurements are made without damage to the coating, and the thickness is indicated directly on the meter of the instrument. Two concentric scales cover a range of 0.0001 to 0.50 in.

Instrument's lightweight and self-contained battery power supply permit its use in the field as well as in the laboratory or on the production line. Typical applications for the Coatingage include the measurement of thickness of paints, enamels, metal plating, protective coatings, scale or coke deposits. The instrument is housed in a luggage-type carrying case 8x9x6 in. deep. Power is furnished by two 67½-v batteries and one 1½-v battery contained in the instrument. Thickness readings are within 10% of the actual thickness.

Branson Instruments, Inc., 456 Fairfield Ave., Stamford, Conn.



Enameled-Steel 6-Ft Folding Rule Can Be Bent and Twisted

A bright white enameled 6-ft zigzag folding rule is made of special hardened and tempered alloy steel. It can be bent and twisted and yet always springs back into normal shape. The white-enamel finish is specially bonded on to pretreated steel. Called the Durall folding rule, it can be used to take inside measurements, measure pipes, rounds and pulleys, and also extends rigidly for out-of-reach measurements. Rule is priced at $1.00.

Durall Tool Corporation, 117 Woodworth Ave., Yonkers, N. Y.

Heavy-Duty Flanged Nuts Eliminate Use of Loose Washers

A range of sizes from 5/16-in. to 1-in. flange nuts eliminates the use of loose washers. They are made from the solid and heat-treated for wear. Stud sets are offered in two additional sizes: One for the ⅜-in. T-slotted machines with 5/16-in. studs and one for 1 1/16-in. T-slotted machines equipped with 1-in. studs.

Step blocks are 2 in. thick and have a range from 3½ to 9 in. They are graduated in 1/16-in. steps. These blocks are interchangeable with the company's other blocks and can be furnished in cyanided steel or hard maple.

Northwestern Tool and Engineering Co., Dayton 3, Ohio

Pocket-Size Gear Gage Designed for Shop Use

A new model gear gage designed especially for shop use can be carried in a toolbox or in the pocket. Teeth of this gage are especially protected against damage. The shop-model gage has 16 blades of the following diametral pitches: 4, 5, 6, 8, 9, 10, 12, 14, 16, 20, 24, 28, 30, 32, 36, 40, 48, 64, in 14½° pressure angles.

The teeth are of the correct involute shape, machined with the aid of special fixtures. The segment blanks of each pitch are first turned in fixtures to conform to the full diameter in accordance with the number of teeth for the full circle. These gear gages are used for a quick check of gears as illustrated.

George Scherr Co. Inc., 200 Lafayette St., New York 12, N. Y.

Midget Single-Stage Regulators For Small Acetylene Cylinders

Seven small single-stage regulators are known as the Midget 7400 Series. Regulators are designed especially for users of small acetylene cylinders where hourly gas consumption and space is limited. Weight per unit is 1 lb, 12 oz. Regulators are constructed for easy maintenance. Any part may be replaced and the entire regulator reassembled in 15 min.

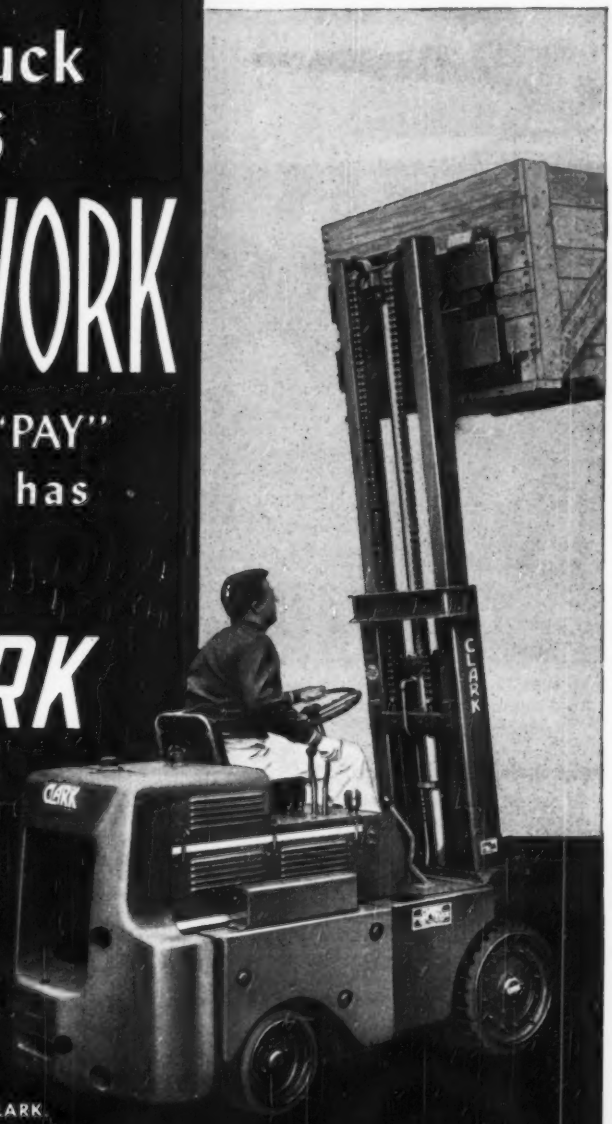
The 7401 acetylene regulator for shops with occasional welding and brazing is large enough for all cutting jobs and handles welding nozzles up to size 8. Other models offered are: the 7402 carbon-dioxide regulator for drink dispensing apparatus; the 7403 liquefied-petroleum gas regulator for medium-capacity brazing and cutting jobs with propane or butane; the 7404 oxygen-line regulator for sit-down production-line work with inlet pressures of approximately 200 psi; the 7405, similar to 7402, but supplied with a needle valve; the 7406, similar to 7402 and 7405, but with petcock and 60-lb gage; and the 7407 air regulator, for small air compressors, shop air lines, etc.

Victor Equipment Co., 844 Folsom St., San Francisco 7, Calif.

This Fork Truck DOES MORE WORK

FOR LESS "PAY" because it has

DYNA *TORK* *Drive*



Available *only* in CLARK'S gasoline-powered Utilitruc, DYNATORK DRIVE eliminates the clutch and conventional transmission. Nothing comparable in the fork-lift-truck field. Benefits so numerous that the important question is: CAN YOU AFFORD TO BE WITHOUT IT?

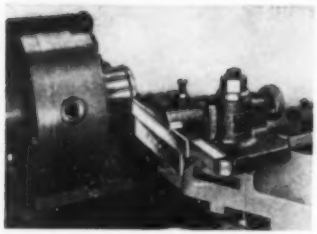
To help get the answer—to enjoy unsurpassed counsel on any materials-handling matters—CONSULT CLARK. Please direct inquiries on your business letterhead to address listed below.

INDUSTRIAL TRUCK DIVISION

CLARK EQUIPMENT COMPANY

BATTLE CREEK 3, MICHIGAN

AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS



Engine Lathe Cutoff Toolholder Features Solid Support

The K-J quick-change cutoff toolholders for engine lathes allow the cutoff tool to rest on a supporting blade which is slightly concave along the top edge, while the lower edge is convexed to fit. This solid support is said to eliminate chatter and tool breakage.

The cutoff blade can be fed into the work under power with no chatter or vibration. The holder accommodates any standard ground or unground blade. The adjusting screw enables the operator to adjust the blade to the correct height without disturbing the adjustment of other tools being used in the toolholder base. The screw rests on a hardened button assuring accurate repeating. This tool is one of a line of 13 standard quick-change toolbit holders made in five sizes for lathes with swings from 9 to 72 in.

The Biggstava Company, 5357 Union Pacific Ave., Los Angeles 23, Calif.

Study of Handling Equipment

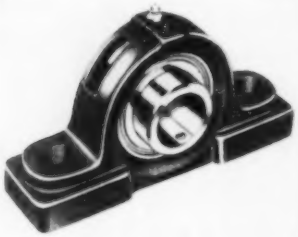
A study of special-purpose handling equipment includes 110 different items illustrated with over 150 photographs. The book has ten sections and covers the fields of industrial power trucks, lift trucks, stackers, special platforms and wheel trucks in so far as a special application and purpose is required. Each Lewis-Shepard representative is equipped with a copy and will show it to those interested.

Lewis-Shepard Products Co., 184 Walnut St., Watertown 72, Mass.

Silicone Rubber Bonded to Metals

Silicone rubber can now be bonded to a wide range of metals. This development is recommended for such applications as gaskets on industrial ovens and commercial defreeze units, diaphragms to seal lubricants in high-speed bearings, suspension parts on conveyors that pass through high-temperature drying chambers or dip tanks containing heat-treated solutions, as well as many other applications. Silicone rubber is outstanding because of its ability to withstand temperatures ranging from −160 to over 600 F.

The Stalwart Rubber Co., 218 Northfield Road, Bedford, Ohio



Pillow Block, Flanged Cartridge, Offer Self-Alignment

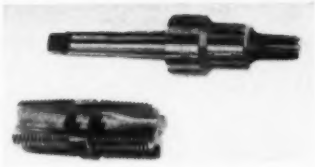
A pillow block and a flanged cartridge offer self-aligning precision ball bearings. Spherically ground OD cuts mounting time as bearing aligns on shaft. High-quality ball-bearing alloy-steel races and chrome-alloy steel balls are used. Inner race is locked to shaft by two knurled cup-point setscrews set at 120°. Both flange cartridges and pillow blocks are available for shafts ½ to 1¼ in. in diameter.

Boston Gear Works, Quincy 71, Mass.

Standardized Magnetic Chuck Is a 16-In. Permanent Type

Standardization of the Walker 16-in. rotary permanent magnetic chuck has resulted in an increase of from 5 sizes of permanent chucks to 25 sizes available. Uniform lines of force over the entire surface have been accomplished by employing the exact proportion Alnico to the mass of iron necessary to polarize the entire surface and at the same time to have magnets polarized with equal force.

The O. S. Walker Co., Inc., Worcester, Mass.



D-Line Taps Are Reversible

The D-line double-end taps are reversible having threads at both ends. The D-line floating tap holder is used in connection with the double-end taps. American Standard taper-pipe and straight-pipe taps in sizes from ¼ to 1¼ in. inclusive of the D-line double-end type are available, along with holders for all sizes. Standard and special machine taps are made to order in sizes from ½ to 1½ in. inclusive.

National Precision Tool Co., Arch Street Extension, P.O. Box 525, Carnegie, Pa.

Dual-Fuel Burner Handles Heat-Treating, Forging

A combination gas-oil burner known as the Series 225 Dual-Fuel burner is designed for rugged applications such as heat-treating, forging and smelting. The burner will handle light or heavy oil as well as gas of any Btu content. The Series 225 model will burn natural gas at atmospheric pressure to give single-valve control.

Without changing piping the operator can switch from one fuel to another. The adjustable sleeve-type shutter allows for open or closed firing as desired.

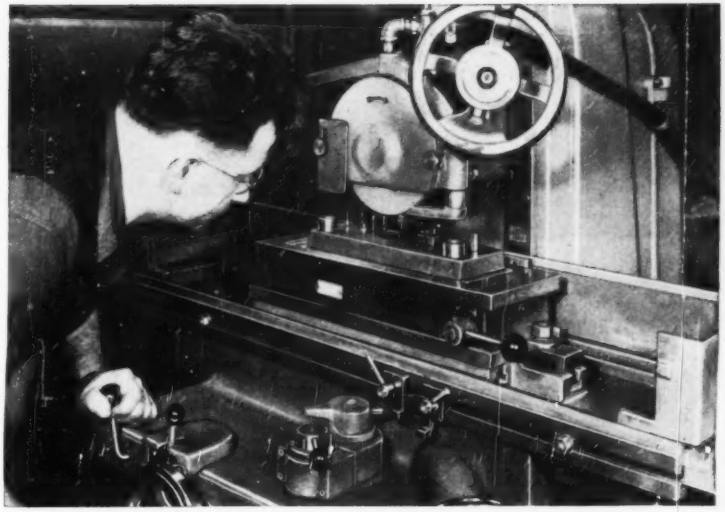
North American Manufacturing Co., 4455 East 71st St., Cleveland 5, Ohio

Quaker Formula 100 Cleaner Is a Powder-Type Product

The Quaker Formula 100, a synergized synthetic cleaner, can be used for removal of mineral-oil-type soils. The powder-type product is used at concentrations of 2 to 3 oz per gal. with water as a tank-type cleaner in the temperature range of 180 F to boiling, and will prepare metal surfaces for bonderizing, electroplating, painting, and other operations with immersion times of less than 2 min in the cleaning cycle. Quaker Formula 100 can be applied to the cleaning of steel, brass, die castings, and aluminum.

Quaker Chemical Products Corp., Conshohocken, Pa.

Enthusiastic Customers do our BEST advertising



Tinnerman Products, Inc. of Cleveland, Ohio, manufacturers of Speed Nuts, use a No. 25 Grand Rapids Hydraulic Feed Surface Grinder in their toolroom. Here their Model 25 is shown grinding a combination die.

You will appreciate the micro-inch finish produced at production speeds on Grand Rapids Grinders. All Grand Rapids Hydraulic Feed Surface Grinders have these outstanding features:

1. **One-piece column and base casting for vibrationless rigidity**
2. **Precision ball-bearing spindle which is greased for life**
3. **Bijur one-shot lubrication system eliminating hand oiling**
4. **Patented vertical movement of wheel head for quick, accurate adjustments**
5. **Portable coolant tank for ease of coolant replacement**
6. **Vane type hydraulic pump for fast longitudinal table travel**

to serve you—

Your inquiry concerning your specific grinding needs will receive prompt attention. Grand Rapids Grinders include: Hydraulic Feed Surface Grinders, Universal Cutter and Tool Grinders, Hand Feed Surface Grinders, Drill Grinders, Tap Grinders, and Combination Tap and Drill Grinders.

GRAND RAPIDS GRINDERS

GALLMEYER & LIVINGSTON COMPANY

330 Straight, S. W., Grand Rapids 4, Mich.

Shorten the time between purchase and profit

With break-even points going higher and higher, your profit depends increasingly on the length of time between the day you order materials and the day your finished product is ready for delivery. Cutting the length of that all-important period will greatly influence the amount of general overhead that must be charged against your selling price.

When you order steel from Ryerson, the process of reducing your production time begins immediately. Your order is given prompt, personal attention and delivery is quick. Ryerson meets your specifications accurately, minimizing the possibility of costly production delays.

Ryerson engineers will gladly assist you in determining the proper steels for the manufacture of your product. And if the steel you require is not immediately available from stock, we'll help you find workable alternates that will keep things moving. So, for time-saving service that brings greater profits, call on Ryerson. Contact our nearby plant for any steel product or assistance on any steel problem.

PRINCIPAL PRODUCTS

BARS—Carbon & Alloy, hot rolled & cold finished.
SHAFTING—Cold finished, ground & polished, etc.
STRUCTURALS—Channels, angles, beams, etc.
TUBING—Seamless & welded mechanical & boiler tubes.
STAINLESS—Allegheny bars, tubing plates, sheets, etc.
PLATES—Sheared & U. M., Inland 4 Way Floor Plate.
SHEETS—Hot & cold rolled, many types & coatings.
MACHINERY & TOOLS—For metal working.

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK · BOSTON · PHILADELPHIA · DETROIT · CINCINNATI CLEVELAND · PITTSBURGH · BUFFALO · CHICAGO · MILWAUKEE · ST LOUIS · LOS ANGELES · SAN FRANCISCO

Pneumatic Vibrators Feature Low Air Consumption

The Series SA pneumatically operated vibrators feature low air consumption, minimum number of parts, and instant starting with full power. They are suitable for a wide range of applications. Vibrators are recommended for such applications as removing matchplate patterns from sand molds, assuring steady flow from hopper, feeding parts for assembly, settling the mix in concrete product and block-making machines, and for other applications in which constant or intermittent vibration is a necessity.

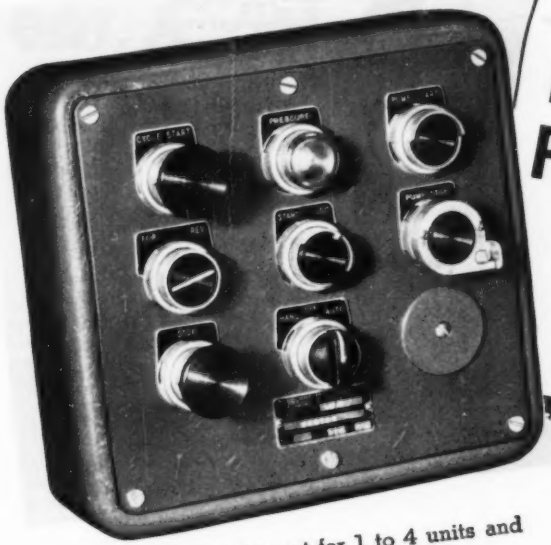
Seven sizes are available with five different mounting arrangements as illustrated. Units range in over-all dimensions from $5\frac{3}{8}$x $\frac{7}{8}$x$1\frac{1}{2}$ in. to 8x$1\frac{3}{4}$x$2\frac{1}{4}$ in. Air consumption of various sizes ranges from 5 to $8\frac{1}{2}$ cfm on 80-psi line pressure. At the same line pressure, speeds of operation range from 5100 on the smaller size to 1950 vibrations per min. on the larger size. Piston diameters of the seven sizes are $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1 and $1\frac{1}{4}$ in.

The Cleveland Vibrator Co., 2752 Clinton Ave., Cleveland 13, Ohio

Boring Head with Radial Offset Has a 1/2- to 6-in. Capacity

This new ABC boring head with radial offset has a ½- to 6-in. capacity. Head remains in balance regardless of diameter of the cut, permitting use of speeds to 1200 rpm. The boring head can be used in a milling machine, drillpress or lathe. Head is dome shaped and devoid of protrusions.

Adjustment of offset is obtained by means of an Allen key provided. Same key is used for locking the head for continuous runs of constant-diameter boring. Tool may be fed in steps of 0.001 in., and is capable of taking cuts up to 0.060 in. Two boring tools of $\frac{3}{8}$ and ½ in. are supplied together with an adaptor sleeve for the smaller tool. Shanks are normally No. 2 or 3



Complete Line of MACHINE TOOL PUSH BUTTONS

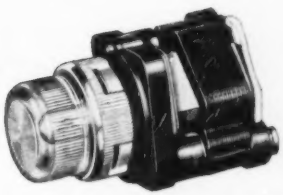
- OIL-TIGHT
- STURDY
- COMPACT
- FLEXIBLE

ENCLOSURES are die-cast for 1 to 4 units and cast aluminum for 3 to 16 units.

UNITS from which stations are assembled have these important advantages—

- Proven oil-tight and coolant-tight by severe tests involving millions of operations.
- All-metal push button operators can take terrific abuse.
- Much more compact, they require substantially less panel and back-of-panel space than previous designs.
- Extra flexibility. A virtually unlimited number of combinations can be obtained from standard units.

Write for Bulletin 9001 Type T. Address Square D Company, 4041 N. Richards Street, Milwaukee 12, Wis.



New Pilot Light has Important Features

Wide angle visibility—Unusual brilliance—Integral transformer—Six-volt lamp filament withstands shock and vibration which frequently cause failures of higher voltage filaments—Bayonet-type socket prevents lamp loosening under severe shock or vibration.

Red and Black Standard Push Buttons

Red and Black Mushroom Push Buttons

Selector Push Buttons

2 and 3 Position Selector Switches

5 Kinds of Contact Blocks

Maximum Flexibility with Minimum Stock because . . .

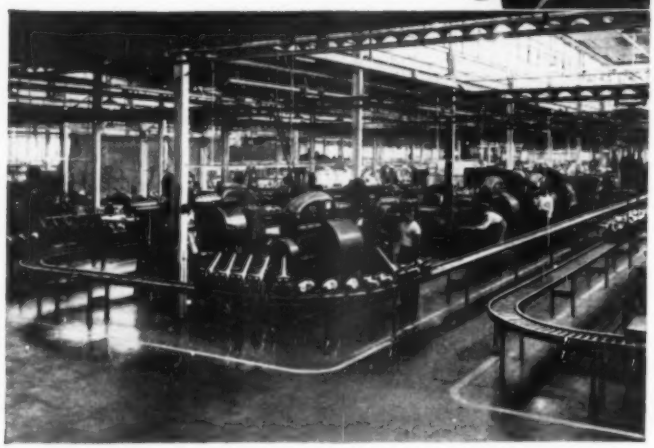
ANY of these Square D Operators can be used with ANY ONE of five Square D 2 and 4 Circuit Contact Blocks

SQUARE D COMPANY

DETROIT · MILWAUKEE · LOS ANGELES

SQUARE D COMPANY CANADA LTD., TORONTO • SQUARE D de MEXICO, S.A., MEXICO CITY, D.F.

"WAITERS" ...cost more than "Tip-Money" in your plant!



MANUAL handling on production, assembly, or packaging lines is costly in manpower two ways—time waiting for material and time required to deliver it.

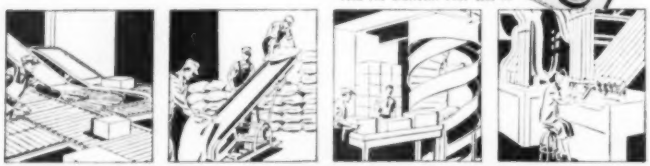
Whatever you make, package, or handle — in large or small quantities — loose or in containers — see Standard for a complete engineered gravity or power conveyor system—a portable conveyor unit — a portable, lightweight conveyor section.

The range and versatility of Standard Conveyor equipment has been developed in more than 40 years of service to business and industry.

STANDARD CONVEYOR COMPANY
General Offices: North St. Paul 9, Minnesota
Sales and Service in Principal Cities

Standard
GRAVITY & POWER
CONVEYORS

Send for Standard's General Catalog—see how conveyors are used to best advantage in every field of industry. Ask for Bulletin No. AM-49



ROLLER · BELT · SLAT · CHAIN CONVEYORS • PORTABLE CONVEYORS AND PILERS • SPIRAL CHUTES • PNEUMATIC TUBE SYSTEMS

Morse taper tanged or tapped for draw bar. Over-all length including shank with $\frac{3}{8}$-in. boring tool is $3\frac{1}{2}$ in. with $\frac{1}{2}$-in. boring tool, $4\frac{1}{4}$ in. Price, $40.

Pearson Phillips Ltd., 194-96 Finchley Road, London, N. W. 3, England

Tru-Loc Top Jaw Feature Permits Adjustment to 1/32 in.

To compensate for adjustment in wear in universal chucks, the Tru-Loc Top Jaw adjustment has been developed. An eccentric bushing with adjusting screws allows adjustment of the top jaw up to 1/32 in. by manipulation of two adjusting screws. The top jaw can be trued up to compensate for wear on the threads of both the scroll and the jaw. The Tru-Loc adjustment has been designed to fit any American Standard Master Jaw.

Whiton Machine Company, New London, Connecticut.

Universal Diamond Tool For Rough and Finish Dressing

This diamond dressing tool is designed for both rough and finish dressing or truing on surface, cylindrical or centerless grinders. Listed as the IC-4, the tool will perform economically on all bond hardnesses of either aluminum-oxide or silicon-carbide grinding wheels. The universal tool employs the use of numerous small solid diamonds, evenly distributed throughout a special Colmonoy wear-resistant matrix.

Diamonds and Tools, Inc., Dept P., 19545 John R; Detroit 3, Mich.

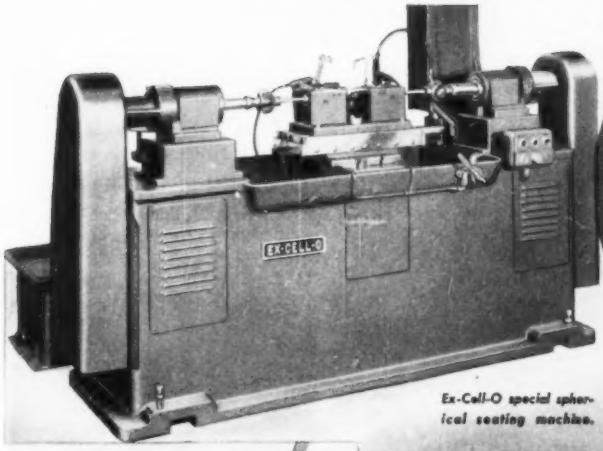
Aerol-Seal Water-Tight Wheel Made of Aluminum Alloy

Aero-Seal water-tight wheels are produced by a permanent mold process, and are said to undergo rigid inspection to insure dust, air

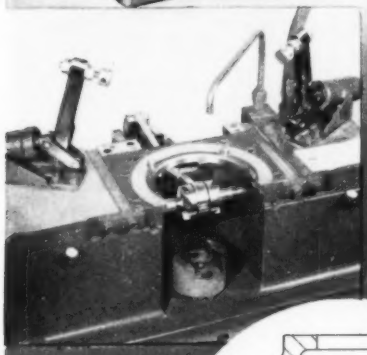
GOT A *Machining Problem?*

SEE

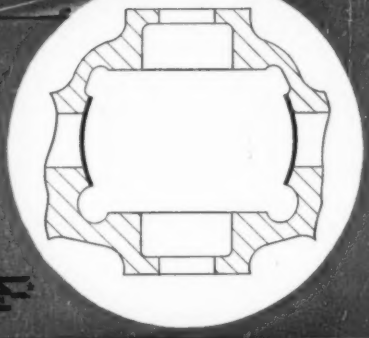
EX-CELL-O



Ex-Cell-O special spherical seating machine.



Left: View of work fixture and cutter on Ex-Cell-O special spherical seating machine.



Right: Heavy floor slow operation performed on differential cases with Ex-Cell-O special machine.

Ex-Cell-O Machine Eliminates Slow Hand Operation on Difficult Job!

Cutting spherical seats inside automotive differential cases is ordinarily a slow hand operation that is out of place in today's production procedure. An operator working on a drill press loads and clamps the part, runs the tool holder into the work, engages the cutter, then cuts the first seat. This cut completed, he withdraws the tool holder and removes the tool. Then he unloads and reloads or indexes the part and repeats the process for the other seat . . . On the Ex-Cell-O special machine shown here the operator merely loads the part, shifts a valve that controls the clamps and presses a start cycle button. At the completion of the cycle he removes the part . . . that's all the operator does. The machine does the rest!

If you have a machining problem, see your nearest Ex-Cell-O representative.

49-52

EX-CELL-O CORPORATION DETROIT 32 MICHIGAN

MANUFACTURERS OF PRECISION MACHINE TOOLS • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS
DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

AMES

CONTINUOUS ACCURACY · RUGGED CONSTRUCTION · HIGH QUALITY MATERIALS · SUPPORTS · FORGED WHEEL · HARDENED STEEL GUIDEPIN AND BLOCK · FORGED BRASS CASE AND STEM · BURNISHED HARDENED BEARINGS · LOW FRICTION · EXTREME SENSITIVITY

PROFITS

IN POTATO CHIPS DEPEND ON AN

AMES THICKNESS MEASURE!

Sounds as though we're pulling your leg but we're as serious as the chip manufacturer who uses an Ames No. 516 Thickness Measure to constantly check potato slice thickness, thereby controlling material costs and assuring a finished product that is always tops in quality and appeal.

To you we hope this illustrates that new, unusual uses for Ames Gauges — uses that bring more profit dollars to the user — are being discovered constantly. Surely it would be worth studying your product or process to find where an Ames Gauge could brighten your profit picture. Write today for full information on Ames Dial Indicators and Gauges.

Address inquiries to Home Office, 26 Ames Street

B. C. AMES CO. *Waltham 54, Mass.*

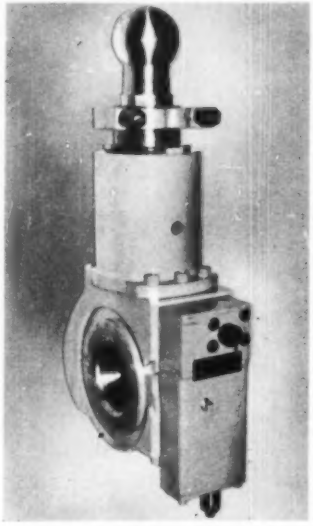
MANUFACTURER OF MICROMETER DIAL GAUGES AND MICROMETER DIAL INDICATORS

Representatives in principal cities

and waterproof qualities. Wheels are made of lightweight, high-strength aluminum alloy. Positive seal is produced by a combination of threaded retainer caps: Neoprene O-rings and retainer spacer are precision fitted to the wheel.

The internal O-ring fits under compression between the internal surface of the retainer spacer and the outside diameter of the axle. The external O-ring is held in compression between the threaded retainer cap and the retainer spacer. Another O-ring or gasket is held under compression by the threaded retainer cap. For wheels using an inside mount, the retainer seal is used on both sides of the wheel. For outside mounts, an interchangeable hex hub cap is used. A tough, all-purpose solid-rubber tire is molded on to the wheel core.

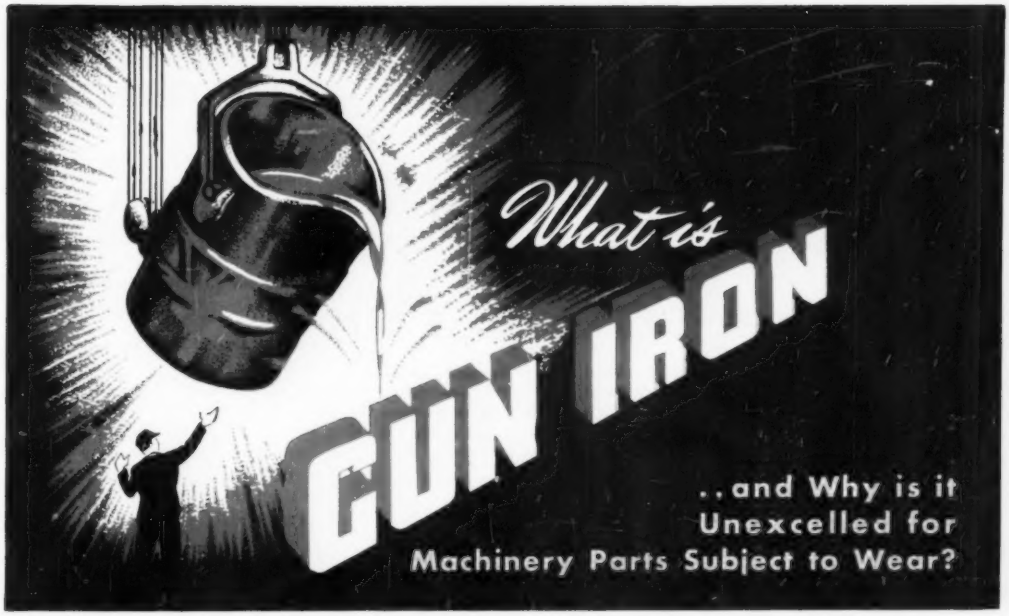
Aero Company, Incorporated, Los Angeles 21, Calif.



Universal Punch Press Pitman For Capacities of 25 to 250 Tons

Universal Punch Press Pitman is adaptable to all punch-press cranks for overload protection for press capacities from 25 to 250-ton. This new style model offers throw bearing including ram connection, machined to size and specifications for fitting individual presses to their size and make. The hydraulic overload jack and safety pitman automatically protects the press from all overload during the work cycle. The hydraulic jacks can be s calibrated to assure fragile dies aximum protection.

Dayton-Rogers Mfg. Co., 2824 13th ..e. South, Minneapolis 7, Minn.

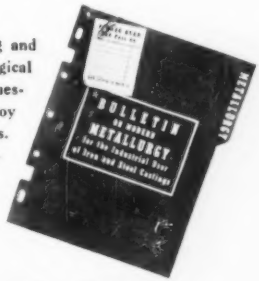


Hunt-Spiller Gun Iron is not new. In fact, its original development dates back to the founding of this company in 1810. Through the years, it became widely known in the production of guns of many types, including the famous Dahlgren cannon mounted on the U.S.S. *Monitor* of Civil War renown. Hence, the adoption of the term "Gun Iron."

In its present form, it is recognized as one of the best materials available for industrial machinery wearing parts. Melted in an air furnace (similar to an open hearth furnace), Gun Iron has uniform chemical, physical and structural characteristics . . . a 100% pearlite microstructure. Unalloyed Gun Iron has an average tensile strength of 40,000 PSI, as compared with 30,000 PSI for ordinary gray iron. When alloyed or specially quenched, its strength can be raised to 45,000–50,000 PSI and Brinell hardness increased from 215 to 450-500. Strength and hardness will hold up to 850°F, with a strength loss of only 12% at 900°F.

In its application to parts which are subject to friction—many of which are cast and machined by Hunt-Spiller—Gun Iron's dense, evenly-graphited structure and uniform strength and hardness offer superior resistance to heat, wear and distortion. These same characteristics also assure more consistent machineability in the shop and more reliable and economical performance of the parts in use.

This interesting and highly informative metallurgical bulletin answers many questions as to what metal or alloy is best for specific purposes. Your copy will be sent, without obligation, upon request on your company letterhead.



HUNT-SPILLER GUN IRON • HSGI • AIR FURNACE PROCESS

HUNT • SPILLER

MANUFACTURING CORPORATION

395 DORCHESTER AVENUE • SOUTH BOSTON 27, MASS.

Canadian Representatives: Joseph Robb & Co., Ltd., 4050 Namur St., Montreal 16, P. Q.

HOW BUILT-IN SAFETY OF

PRESS-RITE PUNCH PRESSES

CUTS PRODUCTION COSTS

EXCLUSIVE — Single stroke non-repeat safety mechanism increases operator efficiency. Allows ample time to check dies and align material resulting in increased output . . . fewer rejects and less down time for repair and maintenance.

Other cost cutting Press-Rite features are:

- Automatic cam actuated brake
- Greater shut height clearance
- Four point contact sliding key clutch

See the Press-Rite Presses at your dealer today or . . .

WRITE FOR BULLETIN NO. P-348A

6 Standard Sizes
5 to 30 ton capacity

Sales Service Machine Tool Co.

2363 UNIVERSITY AVENUE
ST. PAUL 4, MINNESOTA

PRODUCTION UP...

COSTS DOWN with...

HOLE-HOG MACHINE TOOLS

- Multi-Spindle Boring
- Single and Multi-Spindle Honing
- Straight Line Multi-Drilling
- Adjustable Spindle Drilling
- Vertical and Way-Type Fixed Center Drilling, Boring and Tapping
- Special Multiple Operation Machine Tools

"Hole-Hog" does it better with 50 years of Machine Tool Engineering experience at your service.

MOLINE TOOL CO.
HOLE-HOG
MOLINE, ILLINOIS

TRANSMISSION TROUBLES AND THE CHURCH

A practical joker on occasion does a favor to both "injured" parties. Here's a case in point concerning an inquiry card

Nearly 20 years ago The Dodge Mfg. Co., Mishawaka, Ind., received an inquiry card from the manager of the W. E. Savem Co. of Georgia, requesting literature on a new type of bearing. Believing the inquiry bona-fide, the company mailed the literature with an appropriate letter.

Nothing unusual about that—but the interchange of correspondence which followed proved that industry can have both a sense of humor and at the same time offer practical business advice on down-to-earth human problems. D. C. Turnbull, now consulting engineer for American Wheelabrator & Equipment Corp. and at the time chief engineer of the Dodge Mfg. Co., brought to light these amusing letters:

———— Church
Office of the Rector

November 29, 1929

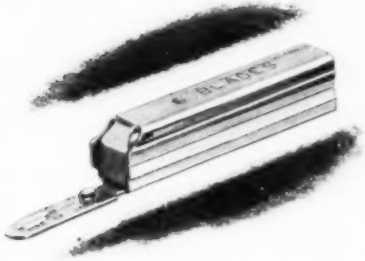
The Dodge Mfg Co.
Mishawaka, Indiana

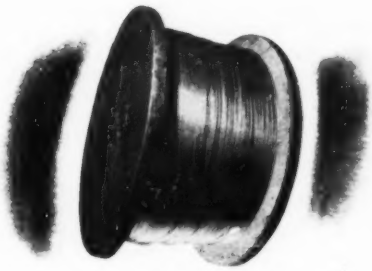
Gentlemen:

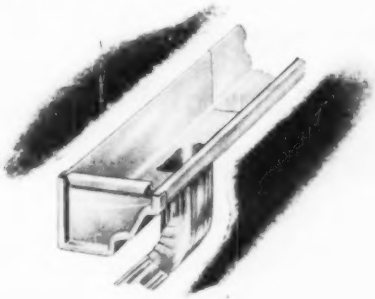
Replying to your letter addressed to me as manager of "W. E. Savem Co." I suspicion that someone has been playing a joke on us both as I did not return the card to you which you state you received from me.

But I certainly need power-transmitting equipment in my business. I have about 560 so-called bearings of all sizes in this church. About 500 of these are loose pulleys of small diameter and very narrow face widths. The loose pulleys present the biggest problems and it seems impossible to generate enough power to make them carry a load. Belts slip all through the plant and even the greatest amount of dressing, addressing and molas-

BEAT COMPETITION WITH IMAGINATION
. . . REDESIGN WITH ALUMINUM







● You're looking at ideas. Each of these redesigned products is a story of lower costs and increased appeal to consumers. That automatic blade changer, for instance, in naturally attractive aluminum eliminates a corrosion-resistant coating operation. The change from brass also provides a substantial material economy.

The beverage case is lighter, stronger, more attractive, now that aluminum serves instead of wood. It is made without bolts, rivets or welds. The cost per trip is lower. And it is easier to keep clean.

Aluminum cable, steel reinforced, is ending a shortage and bringing electric power to thousands of families for the first time. Aluminum costs less than copper and the lighter weight permits longer spans for reduced stringing costs.

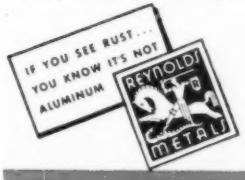
Replacing galvanized and copper for gutters and downspouts, aluminum provides the long life of one at a cost comparable to the other. Simple mechanical joints do away with soldering.

Many of the products you see daily can be improved through the use of aluminum. This modern metal lends itself to modern design. Aluminum is ⅓ the weight of ordinary metals, yet it is strong. Every pound purchased offers three times the material for production. It handles faster, gives products a smart appearance. It takes a wider range of finishes than most other metals. But red-rust is never a problem, so finishing cost is frequently eliminated.

Reynolds Aluminum and its many alloys probably have a place in your designs—why not find out now. For the name of your local distributor or nearest Reynolds Sales Office, look under the "Aluminum" listing in your classified telephone directory or write to Reynolds Metals Company, Aluminum Division, 2523 South Third Street, Louisville 1, Kentucky.

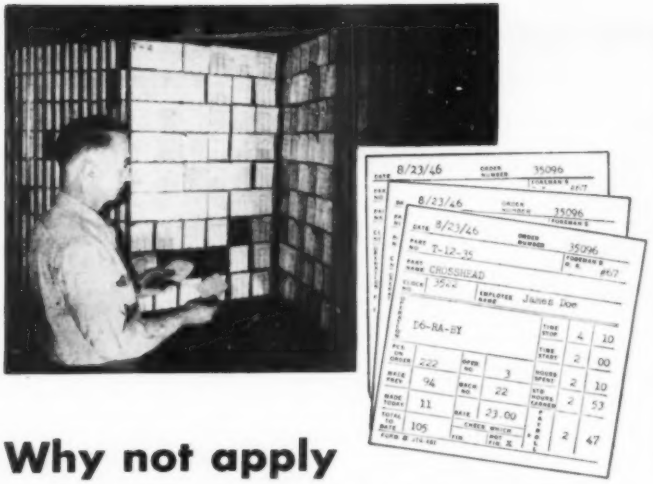
ALUMINUM ALLOY DATA

This informative booklet is free when requested on your company letterhead. Just write to address at left.



REYNOLDS
Lifetime ALUMINUM

THE COMPLETE ALUMINUM SERVICE FROM BASE METAL TO FINISHED PARTS



Why not apply Work Simplification to your Control Systems, too?

Compare the use of McCaskey multiple copy forms and "visible-filing" for Production Control, Payroll and Cost records with the usual posted procedures. The difference in essential operations shown by a simple process flow chart is most revealing. McCaskey eliminates numerous handling and posting operations. The advantages of visible records, immediately available, also add savings in both handling and time.

Barrett-Cravens Company, Chicago, made such a comparison in 1943 and adopted McCaskey for control of both special production orders and stock parts. A few of the important facts they secure, for example, with *only one writing* of their McCaskey triplicate time tickets are:

(1) Status of every production order, special or stock, visualized within minutes after the completion of an operation;

(2) Operation cost data immediately available for analysis and investigation of variations;

(3) Accurate, up-to-the-minute data reduce dependence on stock chasers;

(4) Incentive pay-roll records checked and quantity count verified;

(5) Verified record of production for operators on incentive work, *preventing disputes and dissatisfaction.*

Write for a demonstration and suggestion for an application to your particular needs—or send for a copy of "The ABC's of Production Control" and other descriptive folders.

McCaskey INDUSTRIAL CONTROLS

PRODUCTION • INVENTORY • TOOLS • COSTS • PAYROLL

THE McCASKEY REGISTER COMPANY, ALLIANCE, OHIO

McCaskey Systems Ltd., Galt, Canada The McCaskey Register Co., Watford, England

ses applied to them fails to get the desired results.

You've been in the power-transmission business longer than I have, so any fruit of your experience you care to pass on to me will be appreciated. Best wishes,

Sincerely yours,

* * *

Dodge Manufacturing Corporation
Mishawaka, Ind.

December 20, 1929

Dear Sir:

Your letter of November 29th addressed to us has been referred to the Engineering Department for attention because of the trouble you are having with the present installation.

The Dodge Manufacturing Corporation has been in the power transmission business a good many years. We have experienced some trouble, of course, but not near as much as indicated by your letter where only 60 out of 560 units are running smoothly and efficiently. We are sure it is not a Dodge installation as our improved anti-friction bearings will carry to full capacity month after month without attention, taking thrust in both directions, some installed upside down, and doing it without shaking a nut loose or a cap off, and all on the original filling of lubricant. Each of these bearings has a little knob on top through which more lubricant can be injected when necessary.

Our roller bearing and capillary-oiling loose pulleys come in all face widths and diameters and run quietly under load of belt or stand silently in their places waiting. Squeaking and rusty joints and hard starting are not found in the Dodge family of transmission units.

Our recommendation would be as follows:

First — Make a careful study and analysis of each bearing and pulley now in your plant. Discover the cause of trouble in each case even if you have to go down on your knees to find it.

Second—Group driving has been found most satisfactory where large numbers of similar units are working together. The units are grouped according to size, capacity, gender, or suitability for the task, with an energizing or power

13 REASONS FOR USING **HARPER** NON-FERROUS AND STAINLESS STEEL FASTENINGS

1. **Resistance to Rust and Corrosion**
2. **Resistance to High Temperatures**
3. **Non-Magnetic**
4. **Non-Sparking**
5. **Re-Usable**
6. **Attractive Appearance**
7. **Easy to Clean**
8. **High Strength**
9. **Long Life**
10. **Lower Ultimate Cost**
11. **Resistance to Fatigue**
12. **Easy to Plate or Finish**
13. **Resistance to Abrasion and Wear**

Only 1 Reason for Using Common Steel — LOWER FIRST COST

6000 ITEMS IN STOCK. The widest assortment of bolts, nuts, screws, washers, rivets and accessories in Brass, Bronzes, Copper, Monel and Stainless Steels available from one source . . . large quantities of each. Specials made to order from ample stocks of raw materials.

FOR QUICK RESPONSE on requests for catalogs and samples, wire or write direct to Inquiry Department, The H. M. Harper Company, 8210 Lehigh Avenue, Morton Grove, Ill.

THE H. M. HARPER COMPANY
General Offices and Plant: Morton Grove, Illinois
(Suburb of Chicago)
New York Office and Warehouse: 200 Hudson Street, New York 13
Branch Offices: Atlanta, Cambridge, Cincinnati, Cleveland, Dallas, Denver, Detroit, Grand Rapids, Los Angeles, Milwaukee, Philadelphia, Pittsburgh, St. Louis, San Francisco, Seattle, Toronto (Canada)

EVERLASTING FASTENINGS

CROSS UNIVERSAL GEAR MACHINES

for

- ROUNDING
- CHAMFERING
- POINTING
- BURRING

Cross Universal Gear Machines embody advanced engineering developments to obtain highest productivity and assure lowest possible operating costs.

They feature utmost flexibility for handling a wide variety of gears. Continuous cutting motion, exclusive with Cross, speeds production at top efficiency.

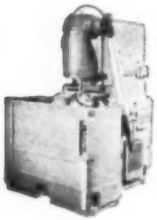
Special skill is not required because machines are automatic and push button controlled. Power clamping is foot pedal controlled. Both hands are free for work handling.

No. 55

For rounding, pointing, chamfering or burring external and internal:

spur gears
helical gears
clutches
splines

Typical productivity when rounding or pointing 8 pitch 30 tooth gears is 55 net hourly.



No. 65

For pointing or chamfering external and internal:

clutches
spur gears
bevel gears
splines

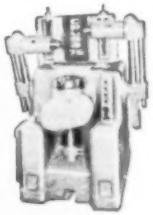
Typical productivity when pointing 10 pitch 30 tooth gears is 100 net hourly.

No. 75

For burring or chamfering both ends at the same time.

helical gears
spiral bevel pinions
hypoid pinions

Typical productivity when chamfering 8 pitch 40 tooth gears is 200 net hourly.



THE CROSS COMPANY
Established 1898

SPECIAL MACHINE TOOLS
MILLING • DRILLING • TAPPING • BORING
TURNING • SHAPING • GRINDING • HONING

DETROIT 7, MICHIGAN

unit assigned to each group guaranteed by actual test to deliver the required amount of power to the group. These groups are all connected to a central control board with proper recording instruments.

Some units should have individual drives if work is intermittent, so that they can be shut down or up without disturbing other units. The source of power supplying these groups and individual drives must be a known quantity and infallible. There is a superpower station near you and proper approach to its Manager will guarantee all the power you can use.

Third — Bearings or load-carrying units in each of your groups must be selected for the particular conditions under which they must work. The load should be distributed over all the bearings. If one is overloaded it is liable to get heated up and the lubricant will all run out. This not only is injurious to the bearing but often damages other goods.

One kind or grade of lubricant will not work in all bearings alike. Proper selection and application must be made. Select those lubricants that are least liable to congeal when approached by a cold body, and will not evaporate when in a heated room or working overtime.

I would say that your use of molasses should be limited to the small bearings only and not too frequently.

Fourth—The trouble with your loose pulleys is no doubt due to the fact that to work well each loose pulley must have a tight pulley close up to it all the time and a collar on the other side to keep it from sliding back from the working position. The number of loose pulleys should never be as many as the tight pulleys in any plant. It is quite possible to convert a loose pulley into a serviceable tight pulley by a little special work at the bench.

If you find that the pulleys furnished you have very narrow faces, then pick two of same diameter and put them side by side to get the width desired. They often do more when used this way than a single-armed pulley with a wide face. Sometimes the wide-face pulleys won't carry the load their face proclaims when put to work.

IRIDITE

gives galvanized parts

2-way

RUST PROTECTION

A clean, sanitary appearance and freedom from corrosion are "musts" inside this beverage cooler manufactured by The Vendo Company, Kansas City, Missouri. That's why Iridite was chosen to finish hardware parts and the galvanized vending basket. Iridite stops galvanic corrosion because it forms protective barrier between dissimilar metals. Iridite blocks corrosion from moisture because it seals the metal from contact with condensed moisture.

3 WAYS TO USE IRIDITE

Iridite offers you a complete line of finishes for any zinc or cadmium surface . . . plated, die cast or galvanized, and for any finishing problem . . . corrosion resistance, paint base or eye appeal.

SIMPLE TO OPERATE

You'll find Iridite easy to use, too. It requires no special equipment or personnel, goes on with a short, non-electrolytic dip, dries fast and gives uniformly good results from manual or automatic application.

If you use zinc or cadmium in any form, you can use Iridite. Write today for data and samples, or, send specimens of your product for FREE IRIDITE PROCESSING. *Special note:* Ask about Iridite Bright for zinc or cadmium-plated parts. See how you can get durability and chrome-like brightness at amazing low cost.

ALLIED RESEARCH PRODUCTS, INC.
4004 EAST MONUMENT STREET
BALTIMORE 5, MD.

West Coast Licensee—
L. H. Butcher Co., Los Angeles 23, California

Fifth—Slipping belts are due to overload, not put on tight enough, or ends poorly fastened, not kept clean, improper dressing, going too fast, or pulleys too small in diameter to allow belts to run around without bending too much. I would recommend two printed books which give some very good data on power-transmission problems. One, the Bible, by several different authors, and our own D-30 Catalog. You can probably locate copies of both in your city or we will be glad to send them from here on request.

These are a few suggestions that may have some little value in solving your problems. We appreciate your writing us as you did and we wonder if it was because of that slogan of ours which runs "Solve your transmission problems by Dodge-ing them."

We trust that the glow of the real Christmas Spirit in your heart may ever increase, and continue over the New Year, proving itself to be the answer to all your power problems.

Yours truly,
D. C. Turnbull
Dodge Mfg. Co.

* * *

——— Church
Office of the Rector

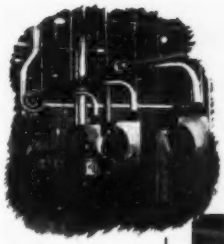
January 28, 1930

Mr. D. C. Turnbull
Dodge Mfg. Co.
Mishawaka, Indiana

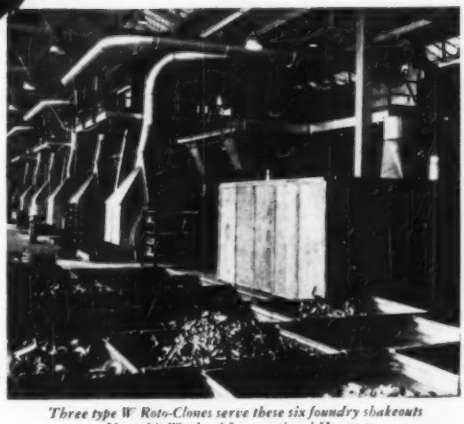
My Dear Mr. Turnbull:

My tardiness in replying to your letter of Dec. 20th has not been due to ingratitude on my part in the least but rather to the pressing duties of Christmas, the close of the year and like circumstances. However, your opinions and suggestions as to our problems in power transmission have been carefully studied and I am of the opinion that our main difficulty is the age of the plant.

For instance, group driving is nearly impossible in this plant. The line shafts have been in use so long that they rebel at full loads and become unmanageable when one tries to introduce new pulleys. Even after doing this with arduous labor and apparent success it isn't long before one realizes that the main pulley on the shaft begins to



48 ROTO-CLONES police dust here!



Three type W Roto-Clones serve these six foundry shakeouts at Memphis Works of International Harvester.

Memphis Works of International Harvester Employ 3 Types of Roto-Clones For Complete Foundry Dust Control

THEY even harvest the dust at International! Grinders (both portable and stand type), abrasive cleaners, sand handling equipment and shakeouts—all are serviced by AAF Roto-Clones*.

Three types of Roto-Clones—D, W, and N—exhausting a total of over 300,000 CFM are used in this modern Memphis foundry. Above you see a battery of portable grinders served by a compact Type D unit. At left is pictured a group of six foundry shakeouts whose dust load is handled by 3 Type W Roto-Clones.

Regardless of the nature or quantity of the dust generated in your plant, there's an AAF Roto-Clone of a type and size designed for highest collection efficiency—plus simplicity, compactness and low operating cost. The experience of engineering Roto-Clones to solve thousands of dust problems is yours for the asking. For complete information, call your nearby AAF representative or write direct to—

Get the Roto-Clone Story!
Bulletin No. 270-A describes the complete Roto-Clone line, its applications and advantages. Write for it now!

AMERICAN AIR FILTER COMPANY, INC.
207 Central Avenue, Louisville 8, Ky.
In Canada: Darling Bros., Ltd., Montreal, P. Q.

AAF
ROTO-CLONE®
DUST CONTROL EQUIPMENT

**Roto-Clone is the trademark (Reg. U.S. Pat. Off.) of the American Air Filter Company, Inc., for various dust collectors of the dynamic precipitator and hydrostatic precipitator types.*

PRECISION
SMALL GEAR
HOBBER

- SPUR GEARS
- SPIRAL GEARS
- BEVEL GEARS
- WORM GEARS
- GEAR SECTORS
- SPLINE SHAFTS
- PINIONS

The Hamilton No. 1 Gear Hobber is designed and built for the generation of small, precision gears exclusively, and in this field it has no equal.

Alignment and trueness of work and hob spindles are held to within .0002" tolerance. Construction is extra rigid for the *maintenance* of precision under heavy production loads.

Speed, feed, and indexing can each be set independently. This feature, plus the wide range of hob spindle speeds (109 to 1259 R.P.M.), permits easy and rapid adjustment of speed and feed to the requirements of material being worked or specifications of gear being hobbed, and cuts set-up time far below previously acknowledged minimums.

The Hamilton No. 1 will add greatly to your production, and will deliver the precision-performance of a new machine year after year. .Investigate it!

OUR BULLETIN H-1-49 WILL BE MAILED ON REQUEST

THE Hamilton TOOL COMPANY
810 SO. NINTH STREET • HAMILTON • OHIO.• U • S • A.

wobble. In haste you make the effort to secure it, increase the bearings around it, add lubricant and do all in your power to hold things together but at best your labors are short-lived, your new pulleys get such vibration that their usefulness cracks and the whole plant has to be gone over again. No matter how dependable the source of power may be you can't get results under these conditions.

In speaking of your bearings you state: "Each one of these bearings has a little knob on top through which more lubricant can be injected when necessary." That's exactly what I used to think as I have scanned these knobs. I have been confident that week by week I was injecting at least some lubricant in a few of them which would result in their running more sweetly and reduce some of the friction I knew they were suffering. But I have grave doubts about such results today. In some cases, I think the holes under these knobs are closed due to an accumulation of rust and dirt and in others where there has been real friction the bearings have run and closed the holes. Many of the second sort have little or no part in the running of the plant today and I have done all I could to remelt and repour them to no effect. Of the first kind I am constantly endeavoring to dig deep enough into them that they may be better lubricated and produce greater service.

Packing two narrow-faced pulleys side by side I find makes them both narrower. They get so much sympathy from each other that they soon refuse to turn a wheel.

As I say, this is an old plant and probably many of its items of equipment will have to be discarded before we can get proper results. That will take a little time yet of course; in the interim I am depending on individual drives for each machine. This plan increases the responsibility of the chief engineer but at least the whole plant does not shut down when one unit gives trouble. This changeover is going to take some time naturally and often requires a great deal of initial work but it does seem a move in the right direction.

Please be assured of my gratitude for the time, patience and

thought you have put on the solution of your problems and if you are ever in this vicinity, I would be so glad to have you drop in and inspect our plant for yourself.

Trusting the New Year will bring you every happiness and blessing, I am,

Gratefully yours,

ROUND TABLE Discussion

FACE-TO-FACE OR BACK-TO-BACK

The fact that the question of the "Old Man" talking to the men is still a matter for discussion is proof that the industrial situation still retains some archaic notions. Who and what is the "Old Man" anyway? And who and what are the men and what are their relative positions? Presumably the latter are the activities connected with the business of industry in the manufacture and disposal of saleable goods into one job. To insure the best results calls for the team spirit, the efforts of all being directed to the one end of maximum acceptable production.

If, broadly, the simile has been accepted, the entire staff of a works becomes a team, with the "Old Man" as captain. It would be passing strange if the captain of a team were to be prevented from speaking to its other members. Such a position could not be considered, it would not be practical. This would not indicate that the captain would interfere with arrangements made by other members of the team; such orders would be the carrying out of overriding instructions given by himself. He would, perhaps, give other general instructions and, it may be, some information on policy. Who better than the captain could be found to do this, and who would be better informed, and what earthly infernal—or heavenly—reason can be advanced against it? Why should he not ask Bill Jones how his wife is or if the baby is doing well?

It was the boast of the manager of one large railway engineering works that he knew the name of every one of his older workmen, and addressed them as such and that many of them would come to him for advice on private matters. One touch of nature makes this whole world kin and, for a highfalutin, top-snorting "Old Man", whether he be

Here's what I hear from the boys who know *Firth Sterling* high speed toolholder bits—

They go for CIRCLE C in a big way! It's the top quality tool bit steel! *But its cost is negligible.* By increasing production even 5% —the resulting man and machine earnings completely eliminate the tool bit cost. And, it cuts materials many other high speed steels can't touch. You can't beat CIRCLE C.

There may be applications in your shop where Firth Sterling BLUE-CHIP (an 18-4-1 machining stand-by for many years) will do the work most economically and satisfactorily and where the top quality Circle C is not required. Or, if you want a still more moderately priced general purpose bit, Firth Sterling STAR-MO M-2 can fill the bill.

Whichever grade you require—if it's Firth Sterling, it's the best for your job.

Bulletin SL-2028 gives you the details on all Firth Sterling High Speed Toolholder Bits—write today for a copy.

Better yet, call your nearest Firth Sterling office for a Representative who can help you choose the right high speed toolholder bit for your particular job.

Firth Sterling

STEEL & CARBIDE CORPORATION

McKEESPORT, PA.

Offices and Warehouses in Hartford, Philadelphia, Cleveland, Detroit, Chicago, Dayton and Los Angeles. Offices in New York and Pittsburgh.

Distributors: Carey Machinery & Supply Company, Baltimore—York Machinery & Supply Company, York, Pa.—Tanner and Company, Indianapolis—Wm. S. Bolden Co., Charleston—Huge-Fayle Company, Houston

In Canada: Chapat Engineering & Sales, Ltd., Hamilton, Ontario

Follow the Leaders...

Use RUTHMAN GUSHER COOLANT PUMPS

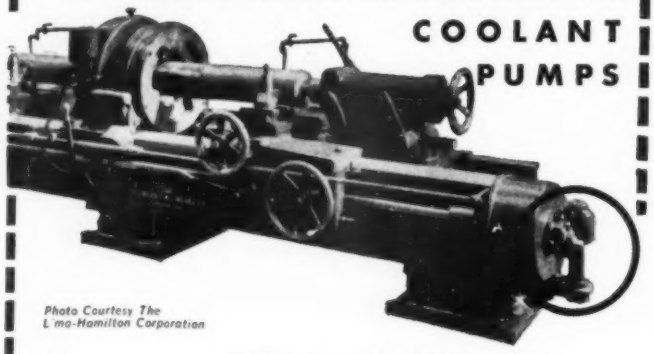


Photo Courtesy The Lima-Hamilton Corporation

This Niles Heavy Duty Axle Lathe manufactured by the Lima-Hamilton Corporation is equipped with a Model 11022 Ruthman Gusher Coolant Pump.

The leading machine tool manufacturers all over the country use Ruthman Gusher Coolant Pumps as standard equipment on their machines. They know from experience that the *exclusive features* built into every Ruthman Gusher Pump gives them a pump which will satisfy the most rigid requirements. You too can be sure of this efficient dependable service when you specify Ruthman Gusher Coolant Pumps on your metal working equipment.

Write for our new catalog today.

THE RUTHMAN MACHINERY CO.

1818 READING RD. CINCINNATI, OHIO

a big or little boss, there is neither room nor need; and a really big man would talk to, and with, his men and none but the pygmies would be upset.

P. E. James
Lincoln, England

•

THAT'S MY BABY

In deciding that the granting of time off must be a function of the front office only, it would seem that the Big Boss is harking back, all unwittingly perhaps, to an old dream. With the introduction of the ubiquitous, but useful, form for the ordering, processing, and progressing of work in its different stages, at the beginning of the century, or earlier, the doctrinaire visualized, as a long shot, the gradual restriction of the foreman's authority, technical, and otherwise. He would be replaced by the front office, via its forms, and these would be all-powerful. For reasons which are not germane to this discussion, the dream was not realized; the need for a strong, resolute, yet kindly foreman remained as clear as ever; the paper form relieved but did not replace the technical knowledge of the foreman and he is as valuable and as necessary as ever.

The Big Boss may have no desire to belittle the foreman, but there is no surer way of doing so than to restrict or usurp his authority in the shop; not only so, but to advertise it, is for the Boss, whether he be big or little, to demonstrate his own ineptitude. It should be remembered that whether the discretion be exercised by foreman, Big Boss, or office boy, the decision will be the result of the exercise of judgment. Who is likely to know the position in the shop best—the production program, and the relation to it of the various men considered: foreman or front office? Surely it is best for the cobbler, always, to stick to his last.

J. E. Powell
Lincoln, England

•

There are always two sides to every story, so undoubtedly there was another side to the issuance of orders by the Big Boss to keep men from getting a lot of time off. However, I am very much on the side of Al in this respect—that the granting of time off from a job belongs to the supervisor of the man involved.

Now if the Big Boss thinks his supervisor does not know how to run the departments, then he had better start an educational program

to school his foremen properly in personnel handling.

The issuance of orders that take away authority which has been originally granted by the job serves only to lower the morale of the supervisors and it also tends to create disloyalty to the Big Boss. It would be far better for the Boss to call Al in and discuss this weakness of allowing more men to be off than is healthy for his departmental operations. Maybe he should train his foremen in budget control and show them what happens with absenteeism running high.

Too frequently the job of being boss is too big for the man who is holding the position. He does "feel his oats." Perhaps he is afraid because he doesn't know how to do his job properly and takes this method of covering up. A good boss is a trainer of men. He does not tell—he leads his men. He handles the problems of the day by educating the men around him to think properly and for themselves. He relies upon them to do their jobs with the minimum of error and spends his time in planning the over-all program of his departmental organization.

Written permission for time off is childish. Business is run on a businesslike basis or it fails to run. If a department functions properly and is making its quota and is operating "in the black," time off for its employees is a decision of the department foreman. He is on the job—he knows whether the men can be off from work without affecting the departmental production. Certainly the Big Boss doesn't know—even if he thinks he does—and many of them will express an opinion.

As previously stated there may have been other reasons for the change in policy. Why don't you, Al, go in and see the Big Boss? Find out why the authority has been taken away from the foremen. Present your views and maybe you will surprise the Boss so much he will retract his executive order. It can happen—in fact, quite often it will happen—if foremen will talk their problems over with the boss. He may be missing some little point that you see all day long. Do a little training and selling on your part.

Charles D. Townsend
Centralia, Mo.

•

"PASSING THE HAT"

Passing the hat and collecting money in shops has definitely become, in the past few years, the most-abused custom we have in the industry.

Practically every week, in most

Do you recognize these HOLTITE fastenings? Guess what industry uses each of them. Check yourself by the list below.

CONTINENTAL makes them all and thousands more

Of all the 400,000 varieties of fastenings that literally hold our industries together, Continental makes a large proportion marketed under the famous HOLTITE trade name. Most of them are standard — screws, nuts, and bolts for every use in every industry. Others like the well-known HOLTITE-Sems and HOLTITE-Phillips screws are patented specialties and the famous HOLTITE-Thredlock, Locktite and Tap screws were first designed and produced by HOLTITE. Sometimes a fastening engineered by HOLTITE for one industry finds an unexpected use in another. Often a HOLTITE-*Engineered* fastening will replace several parts that a manufacturer is using. Why not discuss your fastening requirements with a Continental Sales-Engineer. He will focus on your requirements all the broad industrial-fastening experience and ingenuity of Continental. Remember Continental is constantly improving HOLTITE products, lowering their cost and broadening service.

ENGINEERED FASTENINGS FOR PRODUCT ENGINEERS

A. HOLTITE-Phillips Type "H" Brass Tap (coarse thread—patented slotted point) Screw designed to eliminate taps and tapping operations in fastening polystyrene refrigerator assemblies.

B. Hex-head lag screw, a special development for fastening metal to wood in aircraft assemblies.

C. Special shaped screw to hold sections of home utensil in alignment by small lug at end of thread. Assures proper assembly of utensil after cleaning.

D. HOLTITE-Phillips Set Screw, used in assembling glass panel store fronts. Eliminates driver damage to costly polished panels. Screws made of Aluminum, Stainless Steel or Silicon Bronze to prevent staining.

This Trademark HOLTITE T.M. REG. U.S. PAT. OFF. *means made by—*

CONTINENTAL SCREW COMPANY

1904 NEW BEDFORD, MASS., U.S.A. 1949

New... a cost-saving

EXCHANGE PLAN

for TRI/CLAD *Integral-hp Motors*

LOOK for this EXTRA on the motors you buy

General Electric is happy to announce that the motor exchange plan which proved so successful with fractional-hp motors has been extended to cover integral-hp Tri-Clad motors. 16 Motor Exchange Centers are prepared to make an immediate exchange of Tri-Clad open (dripproof) motors (popular types, 4-pole, 1 to 5 hp) during the first five years of service. How the new plan works to reduce machine down time and motor replacement costs is told in Bulletin GEA-5139 (for motor users) and Bulletin GEA-5180 (for machinery manufacturers). SEND FOR YOUR FREE COPY to *Apparatus Department, General Electric Company, Schenectady 5, N. Y.*

756-2

GENERAL ELECTRIC

A press brake equipped with Wittek No. 6-L Automatic Roll Feed

You Can't Beat WITTEK

Wittek Roll Feeds are made in standard models to meet every requirement in the automatic feeding of strip stock to punch presses or press brakes. The distinguishing feature is their simple and economical method of operation which does away with complicated parts thereby assuring *speed* and *accuracy* in the feeding of various kinds and thicknesses of material.

Wittek Adjustable Reel Stands are designed as companion units to Wittek Automatic Roll Feeds and are available in seven different models to handle *ALL* types of coiled strip stock and wire being fed to punch presses or similar production machinery.

Special units of Wittek Automatic Roll Feeds and Adjustable Reel Stands are engineered to meet unusual requirements.

Write for complete descriptive literature

WITTEK Manufacturing Co.
4320 W. 24th Place
Chicago 23, Ill.

Automatic ROLL FEEDS AND REEL STANDS

shops, there are collections for some cause or other, deserving or not, amounting to a shakedown that causes lots of dissatisfaction and, in some cases of lower-paid workers, causes real hardship.

In one plant we got so sick of the whole business, we decided to do something about it. There were about 6,000 employees. A mass meeting was called for everybody interested in forming a welfare fund. This fund entirely outlawed any future passing the hat in the shop for any purpose whatsoever, unless it was something specially important, and that would require a mass-meeting of all workers to ratify before being allowed.

It was proposed that contributions would be ten cents and five cents a week—all workers over $45 a week, ten cents; under that figure, five cents. All would be entitled to some benefits or help when needed. The management was approached and agreed not only that they would wholeheartedly approve, but also offered to do all clerical work free of charge. Contributions were deducted from pay envelopes, separate accounts kept, and turned over to a welfare committee each week.

All funds were put in the bank in the name of the employees' welfare fund. A sick and visiting committee was elected to make regular visits and report back to the welfare committee.

There were a few cases where the sickness that caused the need for financial help was from excessive drinking, and in some cases like that no money was allotted, but groceries, milk and necessities were paid for, and help for doctor bills, etc.

There are lots of salaried employees in that plant who contribute for years and never accept any assistance in cases of prolonged illness, although entitled to it. Of course, they get their salary, but also they are equally entitled to a grant from the welfare fund. This, of course, makes it possible to give extra help where it is most needed.

Any employee getting married is entitled to $20 or a gift equal in value on condition of six months on the job. For the past ten years every year, about a month before Christmas, a general meeting is held of all employees, a statement of the welfare financial position is given out by the secretary, and the book is audited by the firm's accountant. At that meeting extra money is devoted to make the Christmas as happy as is possible for all who are sick and away from the job, all the kiddies are taken care of with gifts, and a large turkey is provided with all the usual trimmings.

Wherever there has been a surplus at the end of the year, the Salvation Army, Red Cross, and other charitable organizations have received a substantial check each year.

This method of handling by shop personnel is far more satisfactory than when handled by the plant personnel office. Workmen feel it really is their baby and they entirely control everything that pertains to it.

This welfare fund automatically did away with the need of shop collections. It also did away with discrimination. It puts the burden on every employee equally, financially, and it costs less to do the whole job on a businesslike basis than had formerly been the case, due to the fact that everyone was doing his bit every week, and it also put a stop to the disruption of work that is caused by collection through the shop, by saving time and expense for the employer.

Arthur Silvester
Niantic, Conn.

•

This subject prompts me to explain the method by which solicitations of the type mentioned have been eliminated in one department of the Wright Aeronautical Corp.

The Engineering Drafting and Standards Division of the Engineering Department has established a social fund controlled by a group of officers consisting of a president, vice president, treasurer and secretary all of which are elected annually.

Everyone in the division is eligible to join regardless of creed, race, color, or position. Dues are twenty cents per month and are collected by certain designated representatives in each section of the department. This money is turned over to the treasurer who is responsible for the collection and disbursement of all funds.

These same representatives are also responsible for reporting all marriages, illnesses, births, and deaths to the treasurer. Examples of how the fund operates are as follows:

(1) When a person is reported sick and after four days have elapsed since the report was turned in, a "get well" card is sent to the sick person. After seven days of illness a gift, usually a book or flowers, is sent to the sick member with a second "get well" card.

(2) When there is a birth in the family of the member, a gift is sent to the family for the new arrival.

(3) In the event of a marriage or death in the family of a member, a wedding gift or funeral wreath is

Revolutionary
NEW METHOD OF
Rust Control

OUTPERFORMS other more complex, more costly rust "preventives". It even answers problems never before solved. It is clean, simple to use . . .

IT ELIMINATES SLUSHING IN OIL!

IT'S.. Angier VPI* WRAP

*Vapor Phase Inhibitor Developed by SHELL

MORE than a non-corrosive paper, a revolutionary packaging method of COMPLETE rust control.

Identical steel parts were exposed 9 months to industrial-marine atmosphere. Unretouched photos tell the story.

Get the Facts Now!

ALSO . . .

PAPERS FOR BUILDING, FARM AND OTHER INDUSTRIAL USES

Angier CORPORATION
FRAMINGHAM 6, MASS.
Industrial Packaging Engineers Since 1895

Gentlemen: Please send FREE 12 page booklet, "Complete Rust Control with Angier VPI Wrap"

Name
Address
City & State

WORLD'S STANDARD
of
Angle Measurement
H. D. BLOCKS and FIXTURES
STANDARD STEEL BLOCKS
CARBLOX CARBIDE
ANGLE BLOCKS
Degrees, minutes and seconds in any combination are at your fingertips with a positiveness and speed that has never before been equalled.
The accuracy of the laboratory has, actually been brought into the shop. Information on this newest Webber contribution to precision is yours on request.
Webber
GAGE COMPANY
12901 TRISKETT RD.,
CLEVELAND 11, OHIO
LARGEST EXCLUSIVE MANUFACTURER OF PRECISION GAGE BLOCKS

WEBBER OPENS ITS INSPECTION FACILITIES TO ALL USERS OF GAGE BLOCKS, REGARDLESS OF MAKE . . .

1. Accuracy Certified

We will return the gage blocks with a Certificate of Inspection showing present size in comparison with master blocks CERTIFIED by the U.S. Bureau of Standards.

2. Burrs and Nicks Removed

Accuracy is restored by removal of burrs and nicks. Blocks beyond repair are identified—along with a recommendation for replacement.

Wear inflicted through daily use warrants careful examination periodically.

IT COSTS SO LITTLE TO BE SURE! 84-block set inspected for only $15.00 . . . other sets proportionately lower.

sent to the member from the group.

In setting up a fund of this sort, there are no individual collections with no consequent loss of time for every event occurring. Everybody is treated alike with no discrimination being shown. There are no disgruntled members because there is no inequality in the amount or type of gift bestowed. Dues are collected only once a month, usually on the last payday of the month.

When a balance of $400 is attained, collections cease until the balance is reduced to $200 when collections are resumed.

Also, no funds are permitted to be diverted for or used to finance social functions of any kind.

You can readily see from the above description of our plan that we have taken care of these "personal touches" which mean so much to the affected person in a sensible democratic way, and everyone is justly proud of the efficient manner in which each case is handled and disposed equitably.

It is the writer's hope that this information will be beneficial to other organizations who may be interested in adopting a plan of this sort for these contingencies.

R. F. Schwarzwalder
Assistant Project Engineer
Wright Aeronautical Corp.

■

PASSING THE HAT

Passing the hat among Penner's workmates is going to have an uplifting effect on the old man such as could never be accomplished by the personnel department or any other division than his own. Such an act is one of the best tonics to be had.

There are still Americans who have soft spots in their hearts for others who may be unfortunate, and though the amount gathered may not be large, it will show Penner, better than words, that he is missed, is well thought of and that he is appreciated by the crowd he works with.

True, a gang of men, some liberal, some otherwise can bring a sick man's spirits to a high level, no matter how much or how little each man may give. Some will give until it hurts.

A welfare fund has worked out very well in some cases. By this we mean that each man will put a certain amount in the kitty each week and so establish a treasury from which the men who meet with reverses can draw if they wish.

The amounts to be drawn should be decided by a committee of workmen, being careful that there is no prejudice against the recipient.

The reason for cautioning in this is

that, in every shop, there are, many times, sore heads in regard to a particular party. It is a shame that this is so, but it is one of the evils of humanity.

Now, in regard to such a matter, the personnel department may pass out the donations but this is a cold-blooded proposition.

In most cases, these amounts usually come to the patient by mail in the form of a check and no man will or can take the interest in such a deal as he will when a "couple of the boys" heave in and hand him some folding money along with a couple of wisecracks, a warm handshake and real feeling between all present.

Many times, the recipient has had tears come to his eyes and he has been unable to speak until his emotion has subsided.

These men don't forget these favors and usually when the hat is passed around later they donate handsomely.

One firm, of big proportions, does not encourage these donations by their employees.

They specify, except in the cases of day laborers, that all employees must have learned one of the mechanical trades or be a college graduate.

They own about 75% of the homes in the village where they are located.

They rent houses to employees at rates much below the ordinary for the same class of accommodations in other towns; also, they keep these houses in repair.

When the head of a family is taken ill or he meets with an accident which lays him up, his rent ceases, and they supply his family with fuel.

He receives medical and surgical care of the best kind; a registered trained nurse is in attendance if necessary, in fact the firm does everything but set his table and this can be arranged by means of a revolving fund.

During all of this, his children have attended a good school within walking distance of all inhabitants, with teachers of ability for they are chosen by intelligent men or women who are well educated and have the ability to select them.

Does anyone think that there is much labor turnover under such circumstances?

Emphatically NO.

The conditions here are about the nearest to the ideal which one can ordinarily find for all classes of employees.

However, with many firms, the dealings with employees are as cold as the North Pole and passing the

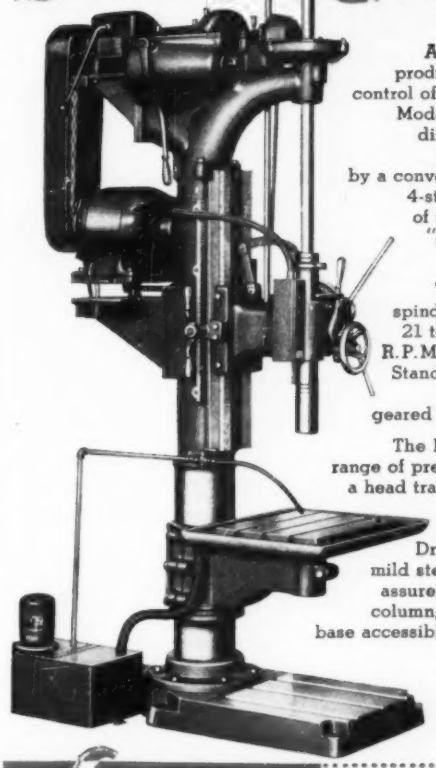
NOTICE

The New

SIBLEY MODEL D

DRILLING MACHINES

in 24" and 28" SWING



An operator gains greater productivity from the ease of control offered by the new Sibley Model D. The V-belt drive is direct to a 4-speed geared transmission, controlled by a conveniently located lever. A 4-station switch at the front of the machine includes an "inching" button to facilitate changing speeds.

Three optional ranges of spindle speeds are available: 21 to 365 R.P.M.; 25 to 419 R.P.M.; and 37 to 650 R.P.M. Standard equipment includes automatic spindle stop; geared power feeds; back gears.

The Model D handles a wide range of precision drilling jobs with a head travel on the hand scraped column of 25" and a spindle feed of 11". Drilling capacity is 1¾" in mild steel. The heavy table arm assures rigidity and swings on column, to make the machined base accessible for a working surface.

Model D-24 Drilling Machine is illustrated complete with coolant pump and fittings, electrical reversing, 5 H.P. motor, magnetic starting switch, and rectangular oil groove table.

SIBLEY

MACHINE & FOUNDRY CORP.

28 EAST TUTT STREET

SOUTH BEND 23, INDIANA

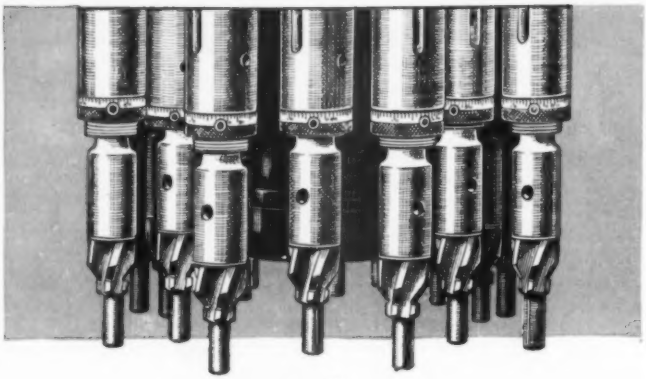
SIBLEY MACHINE & FOUNDRY CORP.
28 East Tutt St., South Bend 23, Indiana
Send Catalog No. 68

Name _____ Title _____

Company _____

Address _____

City _____ State _____



NOW . . . a *new* Gairing MICRO-NUT

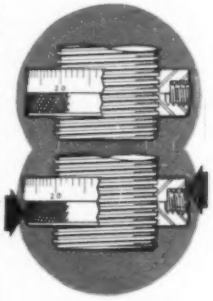
THE "FUL-GRIP" IS ACCURATE, COMPACT, ECONOMICAL

GAIRING who, years ago, was first to make a micrometer adjusting nut under the name of Micro-Nut, offers a completely new, much improved version: the GAIRING FUL-GRIP MICRO-NUT, much lower priced.

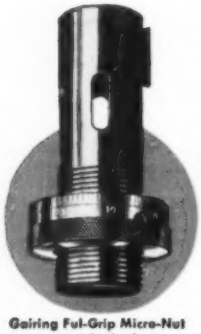
Fitting all standard adapters, with or without keyways, it provides a *full grip* between the thread angles of nut and adapter or other threaded tool shank.

Made in two pieces permanently assembled, this nut may be freely moved up and down along the threads to its approximate position. (No spanner wrench is required to move nut on threads). A mark is then made on the spindle opposite the .001" graduation provided on the nut. From that point on adjustment may be made to well within .001". When set, the Allen screw in the nut is tightened.

This set screw does not come in contact with the thread on the adapter, where it might cause damage. It merely alters the relation between top and bottom halves of the nut, and causes a tight grip on the angle of the threads all around, giving perfect parallel contact between top of nut and end of machine spindle.



Tightening of Allen screw moves top and bottom parts of nut in opposite directions, giving full grip on threads all around



Gairing Ful-Grip Micro-Nut on a standard adapter

On drill heads and multiple spindle set-ups, Micro-Nuts are everywhere replacing the standard adjusting nut. They accurately set tools to correct depths and permit quick and accurate individual adjustment, after replacement or regrinding.

Gairing Ful-Grip Micro-Nuts are a well engineered answer to this widely felt need. They will retain their true diameters, as the rings are solid and threads uninterrupted. Made in standard sizes ¾" to 1⅞" with National Acme Thread. V-thread is made to order only. Write for literature.

GAIRING TOOLS

THE GAIRING TOOL COMPANY, P. O. Box 478, Detroit 32, Michigan

hat seems to be the best way out of it.

Lastly, when either liberality upon the part of the firm or the hat method is a matter of expediency and depend upon many conditions but both are good for they accomplish a purpose.

Both are promoters of Christianity.

F. H. Stebbins
Worcester, N.Y.

•

I was employed quite a few years back by a company where almost every payday a collection was in progress. These collections included flowers, for funerals, wedding presents, welfare funds, gifts, parties, and many times we contributed from force of habit, without asking questions. One day a collection was being made for flowers for the funeral of an employee's grandfather. This was the straw that broke the camel's back! We had a lunch-hour discussion regarding the contributions and finally appointed a treasurer to collect a quarter a week from each employee and turn it over to the company cashier for safe keeping. A committee was then elected to determine when and how much should be spent for each occasion. It was surprising how the fund grew; in fact, we had a picnic every year with the surplus.

In another plant, we used the same principle. Once a month a dollar was deducted from our pay and turned over to the welfare fund. To accomplish this, each employee signed a form once a year to permit the company to make the deduction. Whenever the fund was exceeding the estimated required balance, a dinner and dance was planned or a theatre party.

In both of these plants, a certain sum was set for each disbursement, for instance, $10 for flowers, $25 for a wedding gift, etc. In this way there was no discrimination. Additional contributons were not permitted unless a specific department desired to raise funds for its own purpose, which was not included in the welfare fund.

The size of the plant and number of employees will determine how this situation should be handled. Where the number of employees is very small, the contributions would have to be exorbitant to amount to a reasonable sum. Some employers carry the expense entirely and others share an equal amount with the employees. I was employed in a shop with only seven employees and whenever a collection was made, the employer donated a similar amount or made up the balance. In

another plant, the employees were prohibited from soliciting funds for any reason without the permission of the manager and he seldom gave his permission.

The management or union should establish a welfare fund which would be convenient to the employees. In a small shop the donations will be small but sufficient to cover the cost of mailing cards of congratulations, condolences, etc. If there is no policy in effect covering this problem, the management should quickly adopt one. Either by co-operating with the employees to establish a fund or prohibiting the solicitation of funds the employer puts his policy before the employees.

Frank J. Zarnowski
Rutherford, N. J.

•

IS IGNORANCE BLISS?

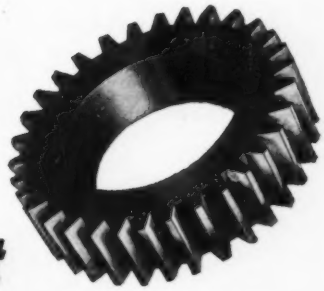
Yes, Ed, most of your men are pitifully ignorant and so are you, when they are making parts for something which they do not know what it is, or what it is used for. If a man knows what he is doing, he will do his best. If he knows where the part he is working on is going to be used, it helps a lot again.

Ed is of the old German school. In Germany 40 years ago a man had to do what he was told, right or wrong. He could not question it. Not only the men, but the foremen, supervisor, etc. Do it and that's all. If something went wrong, the machinist and the foreman had to stay there—doing nothing until told what to do. We are different; we take pride in what we do, and not only what we do directly, but in what we do as a group.

If we make, as Al said, a calculator and my job is only to sweep the floor, when I see an ad in the paper or in a shop window I will stop and point with pride: "You see that machine? We make it in our shop."

In one case, we had to make shafts for which the print showed a tolerance of plus or minus 0.0005 in. The bushing used where the shaft fitted was 0.015 in. oversize, so the print was soon corrected to read +0.005 —0.005-in. Now we and the engineer are satisfied as we can make the shaft needed cheaper and with fewer rejections.

On another job, also on shafts, the print showed a center on both ends. The man on the job asked if the center was necessary, and for what purpose. The engineer said he thought it would be better to machine them that way. After consultation, the centers were eliminated and they were made from bar stock to the sat-



contact

PERKINS

first for custom-cut

GEARS

We have manufactured precision gears to customers' specifications for nearly 30 years. Our production equipment comprises modern machine tools and our facilities are ample to meet all demands for the mass production and prompt delivery of such gears.

Our engineers will be glad to work with you on any problems you may have pertaining to gear design. Recommendations as to proper design for LOWER COSTS—cheerfully given. Once your specifications are in our files, reorders are filled automatically. LET US QUOTE ON YOUR REQUIREMENTS NOW!

YOU FURNISH THE SPECIFICATIONS • WE'LL PRODUCE THE GEARS

PERKINS MACHINE & GEAR Co., Springfield 2, Mass.

PERKINS MAKES in all materials, metallic & non-metallic:

Helical Gears, Bevel Gears, Ratchets, Worm Gears, Spiral Gears, Ground Thread Worms

Our extensive facilities and modern machine tools are also adaptable to the manufacture of all kinds of various parts other than gears, such as the following:

SPROCKETS · SPLINED SHAFTS · SCREW MACHINE PARTS

up to 2¼" in diameter.

We are also exceptionally well equipped to build, to your specifications, such mechanical units as—

PUMPS · SPEED REDUCERS & COMPLETE MACHINES

either in experimental or production quantities. Our well-known reputation is your guarantee of satisfaction. Let us quote on your requirements.

9 out of 10 Bearing Needs
AVAILABLE FROM STOCK

JOHNSON
GP
BEARINGS

CHECK your requirements with this Johnson Bronze list of over 850 stock sizes for saving money and for immediate delivery. Large production runs assure low unit cost for you . . . no pattern costs . . . no special machine set-ups. Every Johnson GP (General Purpose) Bearing is completely machined to standard tolerances, ready for immediate installation. Any type of oil groove, slot or hole can be added easily and economically. Every year finds more manufacturers switching over to standard stock sizes for these reasons.

IF you do not have a Johnson Bronze Catalog of standard size sleeve bearings on your desk, we will be glad to send you one at once. Write today!

Johnson Bronze
SLEEVE BEARING HEADQUARTERS
515 SOUTH MILL STREET · NEW CASTLE, PA.

isfaction of all concerned, with more production per hour. Yes, a man has pride, and he should at all times know what he is doing and where the article goes. The finished product should be on display for him to see, feel and examine. Yes, to know is to be wiser. Then if another job comes along some principles of the one previously used may be incorporated in it and the more the men know the more they will be able to help with short cuts.

More and more companies now have suggestion systems. How can anyone suggest something for improvement if he does not know what it is all about?

Michael Axler
New York 30, N. Y.

•

In my opinion a man should know all there is to know about the part he is working on and its relation to the other parts that make up the finished product. In so learning what the other fellow has to do he can hold his specifications within the limits best suited to each operation. Very often an operator who knows something about previous and subsequent operations will notice the specification called for on his operation will not fit in with the other specifications. Very often he can save considerable waste and damage, where operations are closely related.

We must encourage our employees to learn as much as possible about the other fellow's operation and what makes up the finished article. When a bottleneck occurs in one or more departments, we must have employees ready to transfer to relieve this condition. As a foreman, I appreciate and respect a man who I can transfer to some other operation to relieve the pressure at any place necessary. If there is any one secret of success, it is the ability to know all branches of the operations that make up the finished product.

We must always keep in mind the possibility of eventually making two or more parts in one operation. We must be conscious of the other fellow's problems and help each other control the quality.

Be interested in the product you are working on from the time it comes in the door until it leaves the shipping department and eventually someone in the front office will be interested in you. In the final analysis, learn all there is to know about the job you have to do and then learn all you can about the operational product in all phases.

A. E. Salmons
Philadelphia, Pa.

Business Items

F. H. McGraw & Co., New York, has completed a modernization job on a three-stand cold reduction mill for Carnegie-Illinois Steel Corp. at the Gary Sheet and Tin Mill, Gary, Ind.

Iron & Steel Products, Inc., Chicago, has moved its New York office from 120 Liberty St. to larger quarters at 50 Church St.

Manderscheid Co., Chicago, has appointed Clay Sayers to represent the firm in Indiana and western Michigan.

Armco Steel Corp., Middletown, Ohio, has put into operation a fourth major unit for continuous production-line coating of flat-rolled steel in a bath of molten zinc or aluminum.

Arlin Tool Co., Inc., has moved its machine shop to 312 Washington St., Peekskill, New York.

Chevrolet Motor Division, Detroit, has purchased a government-built plant in Saginaw, Mich., which during the war produced aluminum aircraft forgings. Since October, 1947, the plant has been operated by Chevrolet under government lease as an adjunct to its Saginaw transmission factory.

Sharon Steel Corp. plants at Lowellville, Ohio, and Farrell, Pa., have combined operations under one management. H. P. Rees, general works manager of the Lowellville plant has been made general superintendent of the combined plants. William J. McGafney has been named assistant general superintendent.

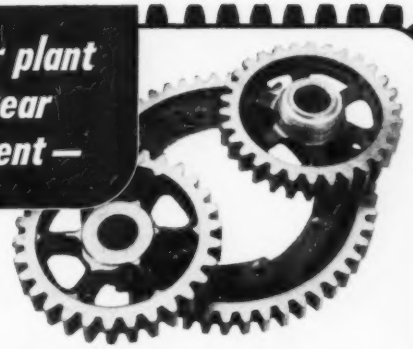
Black Oxide Co., Cincinnati, has moved to quarters at 1739 Townsend St., providing four times the former production space.

Stanworth Mfg. Co., Lebanon, Ind., has been sold to Fred G. Phillips and Walter Susemichel, both of Engineering Metal Products Corp., and J. Edward Marston. The purchasers expect to expand the present line of high speed cutting tools manufactured at Lebanon.

Kennametal, Inc., Latrobe, Pa., has moved its Chicago office to 5830 West 26th St.

Baker-Raulang Co.'s Baker Industrial Truck Div. has moved its general offices, including purchasing, sales, engineering and service departments, to 1250 West 80th St., Cleveland. The division's manufacturing operations, presently located at the West 25th St. plant, will be moved to the 80th St. location soon.

Make our plant your gear department—



Heavy pitch gears for construction equipment.

You can very frequently obtain quality gears and gear assemblies at a saving over present cost.

Our facilities include the most modern gear cutting machines of all types and many specialized machines arranged in batteries for volume precision production.

Expert engineering service is available to our customers for planning production on an efficient and economical basis. Write for a copy of Amgears Case Histories that illustrate the value of our engineering service.

For Purchasing Agents and Production Officials — Delivery Date Calculator free on request.

*AMGEARS, INC. 6633 W. 65th St. Chicago 38, Ill. Phone—Portsmouth 7-2100

*AM—Accurately Made

AMGEARS, INC. CHICAGO

A SUBSIDIARY OF KUPP CORPORATION CONTRACT MANUFACTURERS Detroit • Cleveland • Chicago

NEW MEAD INDUSTRIAL* AIR POWER CATALOG Ready!

MIDGET AIR CLAMPS

AIR CYLINDERS

AIR VISES

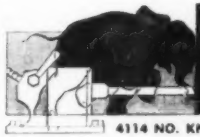
Full of Suggestions for FASTER, CHEAPER PRODUCTION!

WORK FEEDERS

Illustrates, describes Air Cylinders, Valves, air operated Presses, Vises, Chucks, Hammers, Drill Press Feeds, Work Feeders, Timers, semi-automatic combinations, etc.

Write for Complete Catalog!

AIR PRESSES



MEAD SPECIALTIES COMPANY

4114 NO. KNOX AVE., Dept. MA-69, CHICAGO 41, ILL.

Get our LATEST PRICE LIST

of

PRECISION CARBIDE BORING TOOLS

AS A FIRST STEP TOWARD

...BIG SAVINGS

OUR specialty is making tools to customers' specifications. If you're a user of Heald or Ex-Cell-O Precision Boring Machines, we can help you make BIG SAVINGS over your present expenses for replacements in boring, facing and chamfering tools, because all our production facilities and long experience are concentrated on producing at lowest possible cost. And we pass this lower cost on to our customers. Furthermore we have confined our efforts to a comparatively narrow range of tools which enables us to apply the most advanced cost-cutting methods to our production.

Send for our latest price list today. Compare our prices with those you've been paying and you'll appreciate the real value of the service we can render. Our service covers carbide boring tools in a wide range of diameters in any required length. You do not pay a premium for the particular shape you need because all our prices are based on stock diameters. Send blueprints of the tools you require and let us quote.

INDUSTRIAL CARBIDE TOOL CO., Inc.

33 Harman Street WORCESTER 8, MASS.

Automatic Transportation Co., Chicago, has appointed Equipment Engineering Co., Memphis, Tenn., as distributor, serving northern Mississippi, western Tennessee, and eastern Arkansas.

Yale & Towne Mfg. Co., New York, formally opened its new Pittsburgh regional branch sales and service building last month. The new facilities provide local, factory approved repair and spare parts service on materials handling equipment.

Aro Equipment Corp., Bryan, Ohio, has appointed the Aro Sales & Service, Inc., Los Angeles, as its distributor for Aro products on the Pacific Coast. Sales and service for the Pacific Northwest will be handled by the Pratto Sales Co., Seattle.

Cooper Alloy Foundry Co., Hillside, N. J., has appointed Ernest E. Graham of E. E. Graham & Co., Houston, as sales representative serving Texas, Oklahoma, and Louisiana.

The Taft-Peirce Mfg. Co., Woonsocket, R. I., has appointed the G. C. Wood Co., Pittsburgh, as agent in the Pittsburgh area. A. J. Rod Co., Houston, has been appointed as agent for the Houston territory.

Kieley & Mueller, Inc., North Bergen, N. J., has appointed the following representatives: Van Hala Industrial Sales Co., Cleveland, serving that area; John G. Kirkpatrick, Pittsburgh, serving Pennsylvania, New Jersey and New York; Schultz & Martinez, S. de R. I., Mexico D. F., with Ing. Rosendo Caballero, Monterrey N. L., Mexico, handling K & M products in northern Mexico.

Hyster Co., Portland, Ore., has formerly opened its new Los Angeles area retail truck sales and service facilities at 5301 Pacific Blvd., Huntington Park, Calif., with an open house. New location of Hyster's industrial trucks sales and service in Seattle is 753 Ninth Ave.

Automatic Steel Products, Inc., Canton, Ohio, has acquired the Cleveland Tapping Machine Co. of Hartsville, Ohio. W. T. Harrison, president and manager of Cleveland Tapping, will continue to direct operations of the company, and A. M. Wickwire, president of Automatic, will be vice president of the firm. Curtis Franklin will be secretary-treasurer of both firms.

Rheem Mfg. Co. has announced plans to resume operations in Salt Lake City at a $250,000 plant on the wartime site of the Remington Arms Co. The plant will produce stokers at first, later adding gas and oil furnaces. A part of the company's Chicago's operation will be moved to Salt Lake in the near future.

The Torrington Co., Torrington, Conn., and South Bend, Indiana, has appointed the following authorized distributors for Torrington bearings: Binkleman Bearings, Inc., Toledo; W. P. Cunningham Co. and P. L. Walker Co., Houston; Electric Service & Supply Co., Odessa, Tex.; Fischer Bearing Co., Chattanooga, and Tennessee Bearings, Inc., Knoxville, Tenn.

The Dow Chemical Co., Midland, Mich., has moved its Industrial Applications Laboratory from Ann Arbor to Bay City, Mich. The new location affords some 10,000 sq ft of floor space, about four times that formerly available, and will permit use of larger scale equipment.

Buckeye Tools Corp., Dayton, Ohio, has appointed V. E. Lawford as sales representative in the northern California territory. Operating from headquarters in Oakland, Mr. Lawford will service the area between Bakersfield and the Oregon state line.

Detroit Die Set Co. has appointed three new sales representatives in the New England and New York areas. Nelson R. Church of Pawtucket, R. I., will direct sales in that state and in Massachusetts, Vermont, New Hampshire and Maine. E. M. Benson of Meriden, Conn., will serve in that state. New York City, Long Island, Manhattan and northern New Jersey will be supervised by C. W. Keeny of Benson & Church Co., Newark, N. J.

The Denison Engineering Co., Columbus, Ohio, has appointed Alex M. Sneddon, New York, as representative in New York City and its suburban counties. The Henry Walke Co., Charlotte, N. C., has been appointed representative in North and South Carolina.

Hydro-Line Mfg. Co., Rockford, Ill., has named the Leaser Engineering Co., LaPorte, Ind., as representative for northern Indiana and Chicago's south side; and Euclid Machine & Sales Co., Cleveland, Ohio, representative for northern Ohio.

Reynolds Metals Co., Louisville, Ky., has appointed Idaho Steel Products, Inc., Boise, Idaho, as distributor of aluminum mill products for the Idaho territory.

Black & Decker Mfg. Co., Towson, Md., has moved its Indianapolis Service Station to a new building at 1125 West 16th St. The branch will be in charge of J. T. Redmon, service engineer, and M. D. Mooers, sales engineer.

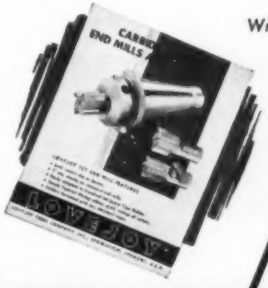
Bay State Abrasive Products Co., has started building a quarter million dollar expansion of its Westboro, Mass., plant.

Announcing
A NEW LINE OF
COST-CUTTING
CARBIDE-TIPPED
End Mills

Lovejoy's new end mills and holders are designed for lower cost metal removal — proved on every job where they are running. Two-flute mills are available from ½" to 1" in dia., and four-flute from ¾" to 2". All have 1" dia. shanks and are tipped for cutting cast iron or steel. Single-flute end mills are available at low cost for testing before using multi-fluted end mills on production jobs. The well-known Lovejoy positive-locking device is used to hold the end mills immovably in the holders and provides quick change of cutters. Another type of adjusting shoe may be provided for use with standard set-screw type holders.

Lovejoy end mill holders are available with Nos. 4, 5, 6 and 7 Morse Taper, Nos. 7, 8 and 9 B & S Taper, and Nos. 40 and 50 N.M.T.B. adapter.

Lovejoy engineers are at your service to recommend standard sizes or design special end mills for individual needs.

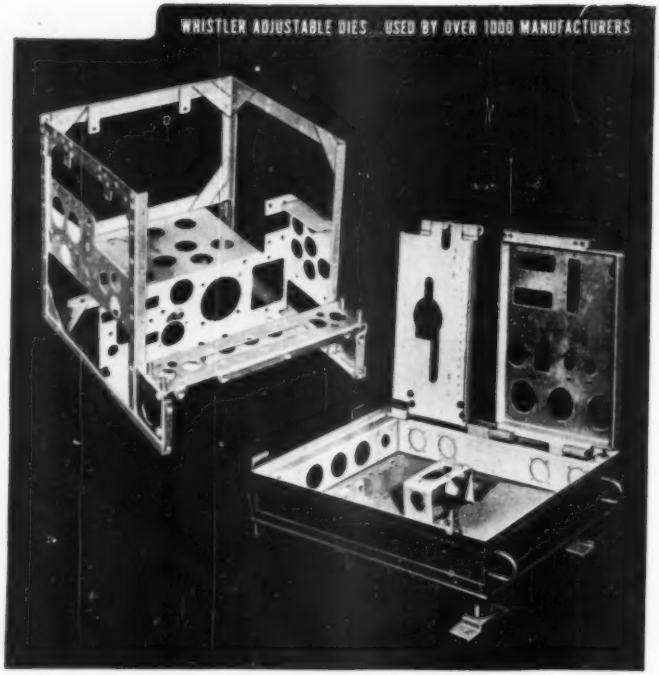


Write for new End Mill Bulletin

"TOOL BITS"

Lovejoy makes a complete line of flywheels which are a valuable addition to most end mill jobs. They increase cutting life, lengthen runs between grinds, improve finish and reduce work spoilage. Write for Lovejoy Flywheel folder or ask for free help in choosing the right type for your jobs.

Lovejoy
TOOL COMPANY, INC.
SPRINGFIELD, VERMONT



SIMPLIFYING COMPLICATED PIERCING OPERATIONS...

HU-50 Perforating unit used in conjunction with standard Whistler Adjustable Dies on the same job.

LEADING manufacturers find it fast, simple, accurate, and economical to use Whistler Adjustable Dies for the tough jobs. Complicated patterns can be set up quickly. It's easy to change hole arrangements too...without waiting and at no extra die cost. New HU-50 units, that pierce at 90° angle, can be used in conjunction with standard perforating equipment. Fewer press operations are necessary.

Savings, through continued reuse of the same dies in different arrangements on many jobs, are most important.

Whistler Adjustable Dies can be used in practically every type press. Standard sizes of punches and dies up to 3" are available in a hurry. Only a few days are necessary to get special shapes made to order.

S. B. WHISTLER & SONS, INC.
758 Military Road Buffalo 17, N. Y.

For more details on this modern way to speed production and save money, write for your copy of the Whistler catalog.

Hydrabuster Corp., a subsidiary of Aeroquip Corp., has been formd in Jackson, Mich. Hydrabuster acquired designs and patent rights on a device which is said to "bust" coal in the mines without the use of dynamite or powder.

Kaiser Co., Inc., Oakland, Calif., has moved its eastern sales office from 30 Church St. to 620 Fifth Ave., New York. W. F. Pelletier, eastern sales representative for Kaiser Steel, will be in charge.

The John S. Barnes Corp., Rockford, Ill., has appointed Cincinnati Industrial Sales Co. as its sales representative in Ohio south of and including Dayton, and in Indiana south of and including Indianapolis.

Crucible Steel Co. of America's new Spaulding, N. J., Works, the last part of a $3,200,000 plant improvement and expansion program, will produce a wide range of cold-rolled alloy and stainless high carbon steel specialties.

Vulcan Detinning Co., Sewaren, N. J., is building a new tin smelting plant. With a capacity of 1800 tons of fine tin a year, the plant will operate on lower grade Bolivian tin concentrates than can be used by the government smelter at Texas City, Texas.

Farrel-Birmingham Co., Inc., Ansonia, Conn., has announced an association with C. A. Lapp & Co., Cleveland, Ohio, who will handle the sale of Farrel gears and gear units in Cleveland.

Apex Toledo Corp., Toledo, has purchased a building at 1937-47 Franklin Ave. The new quarters will provide larger space for the company.

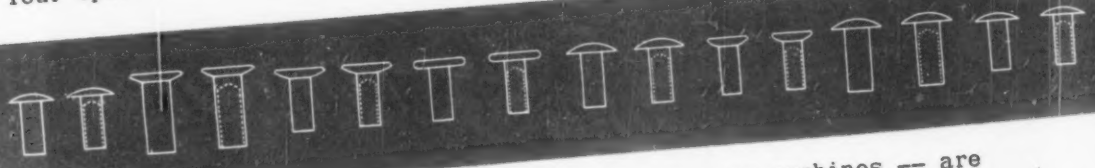
Chicago-Latrobe has opened a new factory branch with complete warehouse stocks at 111 East Milwaukee St., Detroit. This factory branch will carry a complete inventory of all the items of twist drills, reamers, countersinks, counterbores and carbide tipped tools.

The American Gas Furnace Co., Elizabeth, N. J., will be represented in northeastern Ohio, Michigan and western Pennsylvania by Elmer C. Cook, Cleveland, and for the balance of Ohio and eastern Indiana by J. E. von Maur, Dayton.

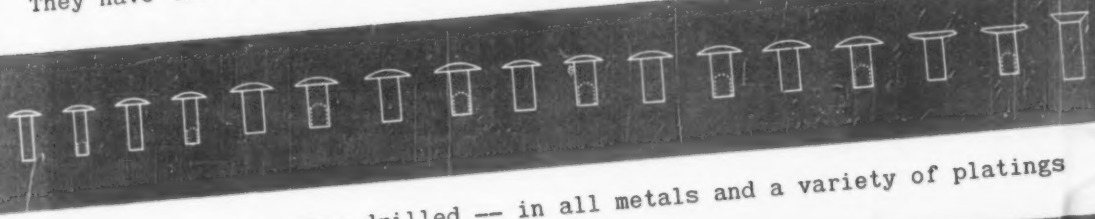
The Puget Sound Sheet Metal Works, Seattle, has awarded a contract to The Austin Co., Cleveland, for construction of a $150,000 steel fabricating shop.

The Black Manufacturing Co.'s newly constructed plant at Parkton, Md., is now in production of paint spray equipment and oxy-acetylene welding and cutting apparatus.

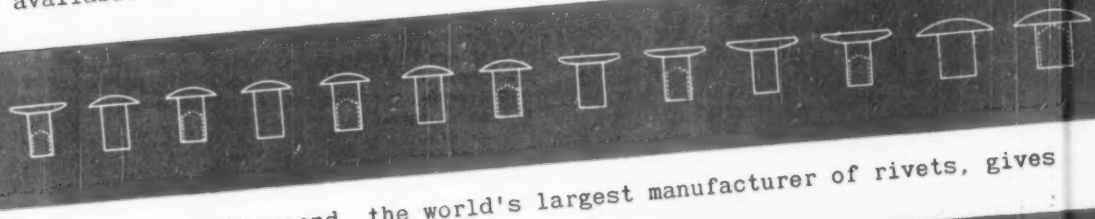
Your operations will flow smoothly when you use Townsend tubular rivets.



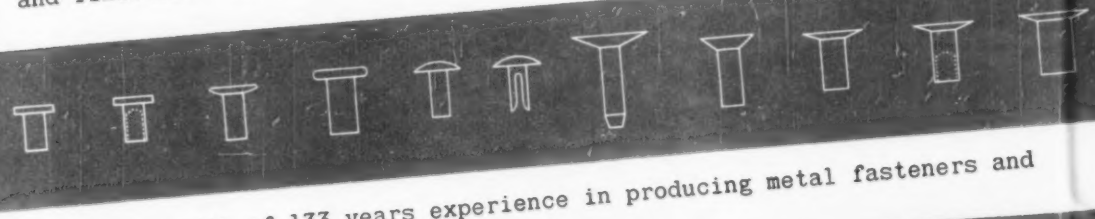
They have the uniform quality to work easily in your machines -- are



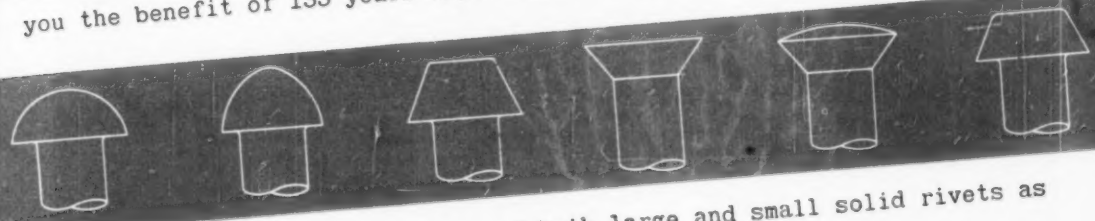
available extruded, also drilled -- in all metals and a variety of platings



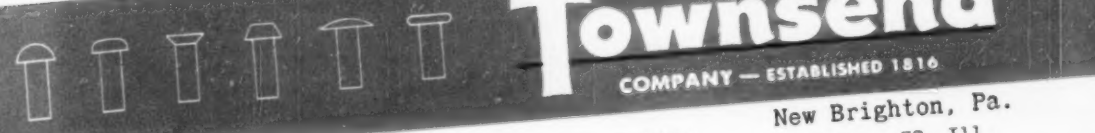
and finishes. Townsend, the world's largest manufacturer of rivets, gives



you the benefit of 133 years experience in producing metal fasteners and



parts including an extensive line of both large and small solid rivets as



well as tubular and split rivets. Write:

Townsend

COMPANY — ESTABLISHED 1816

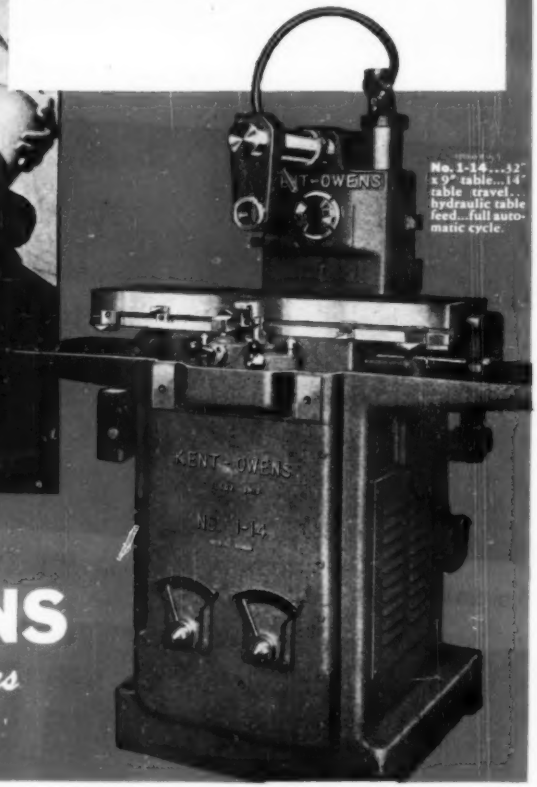
New Brighton, Pa.
Chicago 38, Ill.

Breeze right through

TOUGH MILLING JOBS WITH KENT-OWENS MILLING MACHINES

Now is the time to "chart your course" to greater production and lower costs . . . with Kent-Owens Milling Machines!

Designed for *top-speed* and *accuracy* where the going is tough . . . ruggedly built . . . efficient . . . dependable. Especially, you'll like the many practical features of Kent-Owens Machines that save job-time and labor. Write for bulletins on the Kent-Owens Standard line . . . including wide range of hydraulic and hand operated machines. Also, let our engineers help you with special machine requirements. Kent-Owens Machine Co., Toledo, Ohio.



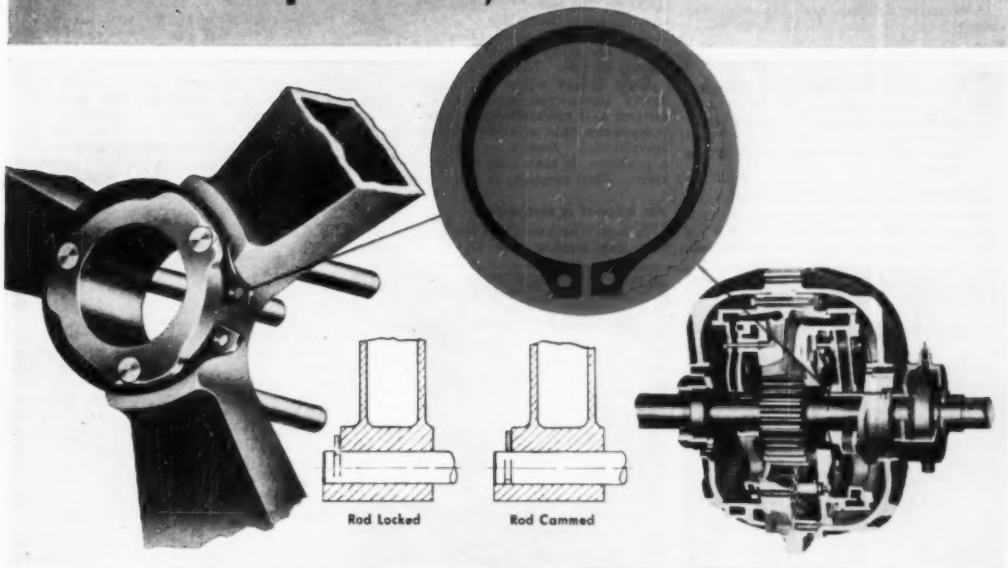
No. 1-14 . . . 32" x 9" table . . . 14" table travel . . . hydraulic table feed . . . full automatic cycle.

Call on

KENT-OWENS

for Milling Machines

Single TRUARC ring holds 3 valve rods, saves $12 production, 10 hours maintenance



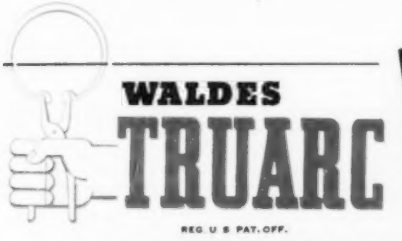
Unique feature of Thomas Varidraulic Drive design is this valve rod assembly, which permits removal and replacement of rods without disassembly of entire unit. One Truarc ring holds three rods, by engaging grooved recesses provided on one side only of each rod. When rotated 180°, rods act like cams. . .spread the ring. . .permit their easy removal. Ends of replacement rods are tapered for easy re-assembly. This design saves an average of 10 man hours of disassembly and assembly time, and eliminates the costly delay of returning the unit to the factory for repair.

Use of 8 Waldes Truarc Retaining Rings in the Varidraulic Drive results in an estimated production saving of $12.00 per unit, reports Thomas Hydraulic Speed Controls, Inc., of Wichita, Kansas.

Savings in production materials and time, plus simplification of repair procedure with Waldes Truarc Retaining Rings tell only part of the story for Thomas Hydraulic. In their own words: "Considerably less skill is required in numerous machining operations and at assembly of the drive than would have been required if the design did not use Truarc rings.

"Our use of Truarc rings has contributed substantially to a more economical design that permits sound sales pricing. Easier maintenance also provides an additional sales point."

Truarc can cut costs and improve your product, too. Wherever you use machined collars, nuts, bolts, snap rings, cotter pins—there's a Truarc ring that does a better job of holding parts together. Waldes Truarc Retaining Rings are precision-engineered, easy to assemble and dis-assemble. Only Truarc stays circular always, to give you a never-failing grip. Send us your drawings. Waldes Truarc engineers will be glad to show you how Truarc can help you.



WALDES

TRUARC

REG U S PAT. OFF.

RETAINING RINGS

WALDES KOHINOOR, INC., LONG ISLAND CITY 1, NEW YORK

WALDES TRUARC RETAINING RINGS ARE PROTECTED BY U. S. PATS. 2,302,948; 2,026,454; 2,416,852 AND OTHER PATS PEND

Waldes Kohinoor, Inc., 47-16 Austel Place AM-6
Long Island City 1, N. Y.

Please send 28-page Data Book on Waldes Truarc Retaining Rings.

Name_____

Title_____

Company_____

Business Address_____

City_____ Zone____ State_____ ★

Locating to close tolerances—2 case studies

Automatic drilling and tapping machines cut costs by locating operations accurately and increasing output per man-hour

Dear Sir:

Automatic drilling and tapping machines locate operations to close tolerances in production because:

All tools operate on the part in the same chucking.

Bushings guide drills and reamers. Bushing plates pilot to the fixtures.

Spindles are located to exact indicator readings.

Automatic unvarying cycles make all parts uniform.

Cost is low when output is high

Notice how low the costs are: 15c for the cam with 56 operations; 2-3/10c for the brake cylinder with 11 operations. These costs include both man and machine on this basis: (1) the current average national wage rate, (2) 80% efficiency, and (3) the machine paid for after only 6000 hours, a fraction of its profitable life. No power or overhead.

Cost is low when a Kingsbury does many operations each hour. Reduce output and naturally unit cost goes up. Sometimes this makes a Kingsbury uneconomical. But if accurate location is a problem, it may still be the best solution. That reminds us of a story.

An expert is surprised

A man who knew our machines saw us one day during the war. "I always thought Kingsburys were high production machines."

"You are 98% right," we said.

"Well then, I just saw some of that other 2%," he said. "An aircraft plant I just visited has a line of 11 Kingsburys. Only one machine was running at a time. Fellow would put one lot of cylinder heads through a machine, shut it off, take the truck load to the next machine and do the same thing there."

"Locating to close tol—," we began.

"Oh, sure, sure, sure," he said. "I realized that right off. After I looked at the job I would hate to do it any other way. Fellows there are tickled to death with their Kingsburys. Said they had several lines of them."

"Indeed they have," we said. "Just ask us to figure a compound angle. We have done so many of these machines we are old hands at compound angles. But at first we had to have 10 engineers figure them. When 2 of them agreed we started with their figures and went on from there."

We admit this application is unusual. We even admit (reluctantly) that there are other ways to drill and tap to close tolerances in production. But we do feel that our proposals for this work merit your serious consideration.

For many high production jobs

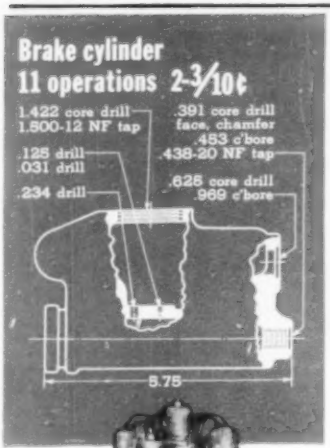
Locating to close tolerances is an important advantage with a Kingsbury. But low cost on high production work is still the main reason for using them. We can make efficient setups for many different jobs — simple or complex, with small or medium operations. (Note the brake cylinder with .031 drill and 1.422 core drill in the same chucking.) Here is why: We can choose from a complete line of standard drilling, tapping and indexing units and attachments. We have designed, built and tooled over 3,500 machines. It is our sole business.

Can we make you a proposal for a tooled machine? Just send a print to our Mr. L. A. Carll. Tell him the operations and hourly output you need. It is worth a few minutes to get the facts.

Sincerely,

Kingsbury Machine Tool Corp.
60 Laurel St., Keene, N.H.

P.S. Free bulletins showing 40 setups are yours for the asking. Please use your company letterhead.

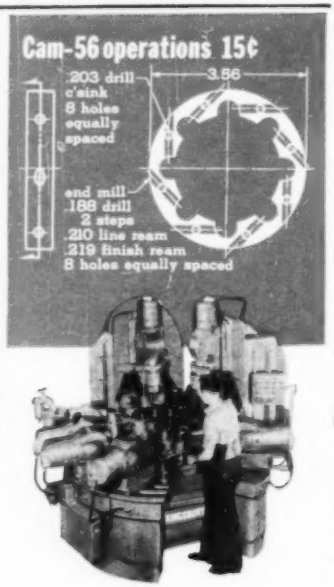


360 PARTS AN HOUR GROSS

To locate every operation exactly, bushings guide every tool except the taps. A ball bearing bushing guides the 1.422 core drill. Other bushings are plain. All bushing plates plug into the fixture or the part itself.

• Ten units operate in turn on each part. The base supports 4 horizontal units, the central column 6 vertical units. Every tool is in easy reach because the working area is not caged in.

• Note the range of operations. A 1.422 core drill (5 hp) and a .031 drill (½ hp) operate in the same chucking.



49 PARTS AN HOUR GROSS

This is one of 10 Kingsburys that an automobile plant uses on related high production jobs to locate accurately peripheral holes inclined at a 40° angle to the surface.

• Bushings in piloted plates guide 3 of the 5 tools for each peripheral hole. The sequence: end mill (guided), drill first step (guided), drill through, line ream (guided) and finish ream. Drilling in 2 steps maintains required output by keeping the time cycle down.

• Each part passes around the machine 4 times. After the 1st, 2nd and 3rd passes, the operator rotates each fixture 98°. Each time around, 2 vertical units with 2-spindle auxiliary heads operate on two .203 holes, and 10 horizontal units operate on 2 adjacent peripheral holes. Five horizontal units are 22½° left of the radial line, 5 are 22½° right.

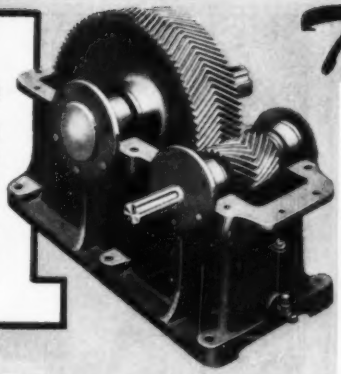
KINGSBURY

AUTOMATIC DRILLING AND TAPPING MACHINES
for Low-Cost High Production

There's a . . .

SINGLE REDUCTION

Standard Ratios from 1.75 to 1 up to 10 to 1 Ratings from .8 H. P. to 2820 H. P.

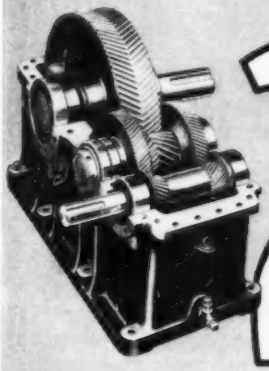


PHILADELPHIA HERRINGBONE SPEED REDUCER

. . . for every requirement

These Units are built in three general classes, single, double and triple reduction types, determined by the number of gear trains used. Each type covers a wide range of sizes and ratios. From this complete line practically any equipment can be provided with the right operating speed, as standard ratios range from 1.75 to 1 up to 320 to 1. These units are also suited for speed increasing.

Helical and herringbone type gears give high capacity and efficiency with smooth tooth action. Symmetrical arrangement of gears reduces shaft stresses and eliminates end thrusts. Pinions are heat treated alloy steel, gears heat treated carbon steel. All shafts are mounted on ball or roller bearings. Efficiencies up to 98% are obtained.

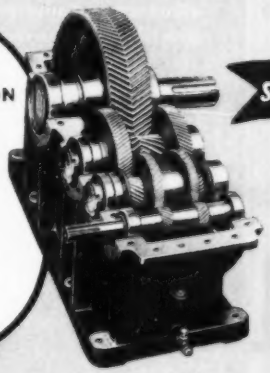


DOUBLE REDUCTION

Standard Ratios 10 to 1 up to 69 to 1. Ratings from .52 H. P. to 1200 H. P.

TRIPLE REDUCTION

Standard Ratios 60 to 1 up to 320 to 1. Ratings from .19 H.P. to 555 H.P.



send for catalog H-39

Other outstanding features of these units are explained in our catalog H-39. Write for a copy on your business letterhead.

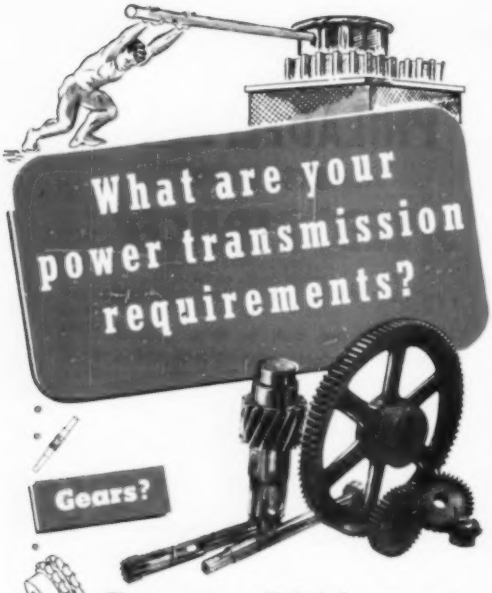
Philadelphia Gear Works, INC.

ERIE AVE. AND G ST., PHILADELPHIA 34, PA.

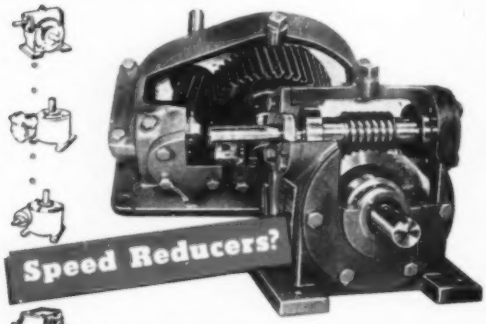
NEW YORK • PITTSBURGH • CHICAGO

IN CANADA: WILLIAM AND J. G. GREEY LIMITED, TORONTO

Industrial Gears and Speed Reducers
LimiTorque Valve Controls



Chances are you'll find the gear you want available from Grant's mammoth stock. If not, complete facilities are available to cut all types. Deliveries made on your schedule. Write today for free catalog describing complete line.

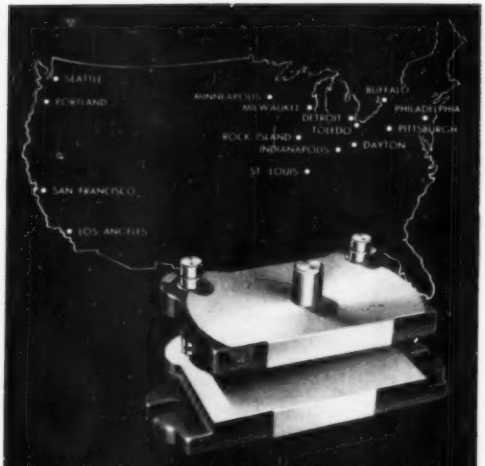


Worm, double worm, compound worm and spur, helical, mitre gear — Grant makes them all . . . reductions up to 3660-1 . . . most types available from stock. Write for catalog describing each type in detail.

Special requirements? . . . unusual and difficult jobs are a Grant specialty . . . for an estimate write outlining your problem.

Grant GEAR WORKS INC.

169 W. SECOND STREET
SO. BOSTON, MASS.



Representation throughout Industrial America

Micro-metric jig-bored die sets in commercial or precision grades are available to you through the DETROIT DIE SET representative in your community. Phone or write for prompt delivery of standard and special die sets and high-precision die maker's supplies.

CALL "DETROIT"

DETROIT	TR 2-5150
BUFFALO	FA 9206
CLEVELAND	GA 3310
DAYTON	HE 3042
INDIANAPOLIS	HU 5604
LOS ANGELES	AD 7251
MILWAUKEE	ED 2-2359
MINNEAPOLIS	AT 5264
PHILADELPHIA	VI 4-4084
PITTSBURGH	GR 1362
ROCK ISLAND, ILL.	RI 743
ST. LOUIS	FR 6811
SAN FRANCISCO	EX 2-7018
TOLEDO	GA 5706
WINDSOR, CAN.	3-9086

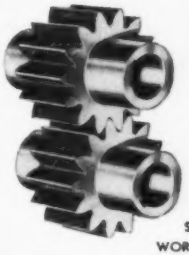
DETROIT DIE SET CORPORATION
2895 W. GRAND BLVD. • DETROIT 2, MICHIGAN

DETROIT DIE SETS ★

CINCINNATI GEARS

Simplify

Your DESIGN PROBLEMS



Specify Cincinnati Gears, Good Gears Only, and you simplify the problem of fitting gear drives into the crowded spaces allowed on so much of your equipment.

Each Cincinnati Gear is made to meet your particular requirements . . . and to your exact specifications.

We welcome the opportunity of working with you . . . to simplify your design problems.

SPUR • BEVEL • HELICAL • SPLINE
WORM • SPROCKET • INTERNAL • *ZEROL
*CONIFLEX • SPIRAL BEVEL

*REG. U. S. PAT. OFFICE

THE CINCINNATI GEAR COMPANY
"Gears . . . Good Gears Only"
Wooster Pike and Mariemont Ave. • Cincinnati 27, Ohio

BILGRAM
BEVEL GEARS
Straight — Spiral Teeth

ALL TYPES
ALL MATERIALS

BILGRAM GEAR & MACHINE WORKS
1217-35 Spring Garden, Philadelphia, Pa.

GEAR CUTTING MACHINES
Well Designed . . . Good Features
Create Production Advantages
NEWARK GEAR CUTTING MACHINE CO.
69 PROSPECT ST., NEWARK 5, N. J.

LUERS Patented Cutting Off Tool Holders
Patented Cutting Off Blades
ONLY the PATENTED construction of LUERS cutting off BLADES permits normal expansion of bursting chips — MEANS MAXIMUM CUTTING EFFICIENCY.
Manufactured By
J. Milton Luers — 12 Pine St. — Mt. Clemens, Mich.
Produced under License Issued by John Milton Luers Patents Inc.

MP QUALITY GEARS MP
CUT TO ORDER

• MEISEL produces but one *kind* of gears . . . gears constructed for specific jobs. Only through the inherent accuracy of this special designing could such dependability, performance and economy be possible. Tell us what you expect it to do, and we'll show you the *one* gear suited for your job.

MP MEISEL PRESS MFG. CO. MP
946 Dorchester Avenue Boston, Mass.

GANSCHOW CUT GEARS

SPUR—SPIRAL
BEVEL—RACK
AND PINION

MEMBER OF AGMA

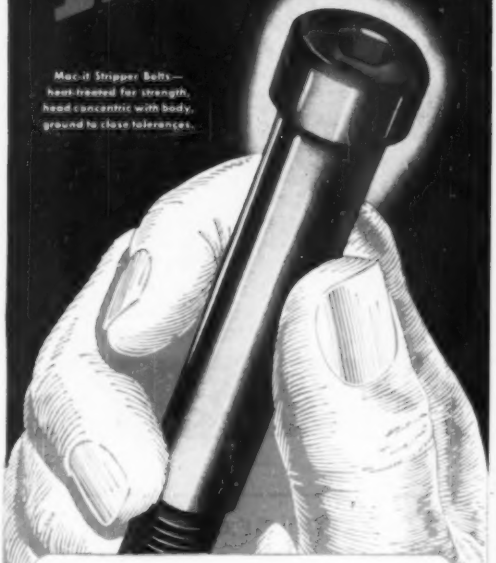
UP TO 60" PITCH DIA.
UP TO 10" FACE WIDTH

GANSCHOW GEAR CO. • 14 N. MORGAN ST., CHICAGO 7.

IT'S A

Mac-it

PRONOUNCED "MACK-IT"



BETTER, FASTER SERVICE WITH THIS *COMPLETE* MAC-IT LINE!

Because many standard types of Mac-its are stocked throughout the country for quick delivery, and because specials can be engineered to your own specifications, you'll find it pays to investigate Mac-its *first.*

Mac-it's 35 years' experience in the manufacture of heat-treated, alloy steel screws is your assurance of precision, uniformity and strength. Sold through leading industrial distributors from coast to coast and in Canada. Write for new catalog today!

Other Mac-it products include:

Hollow Lock Screws
Socket Head Cap Screws
Hollow Set Screws
Hollow Pipe Plugs
Socket Screw Keys
Square Head Set Screws
Hexagon Head Cap Screws
. . . and many others

Marketed Nationally Since 1913 by

STRONG, CARLISLE & HAMMOND COMPANY

Cleveland 13, Ohio

Manufactured by MAC-IT PARTS COMPANY, Lancaster, Pa.

Versatile!

The OLIVER ACE Cutter Grinder

OLIVER OF ADRIAN

There is no more versatile cutter grinder on the market today than The Oliver ACE. The range of cutting tools accommodated by this machine with a minimum of extra fixtures is unparalleled—face mills up to 15" diameter, end mills, side mills, hobs, reamers, spot facers, slitting saws, counterbores, double angle cutters, helical gear cutters, staggered tooth cutters, chip breakers, taps, flat broaches, slab mills, and many more.

The Heavy Duty Model shown above was designed especially for the sharpening of Tungsten-Carbide, Stellite, and other hard metal cutting tools.

SEND FOR LITERATURE

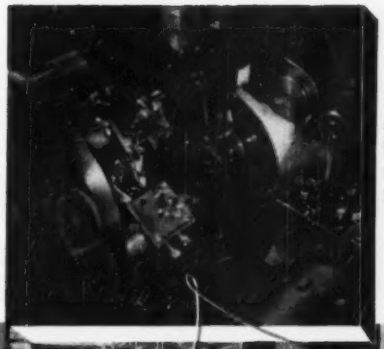
IMPROVE YOUR TOOLROOM IT'S THE BACKBONE OF PRODUCTION

OLIVER INSTRUMENT CO.

1414 E. Maumee Adrian, Michigan

OLIVER OF ADRIAN

"We get unusually good finishes on heavy cuts

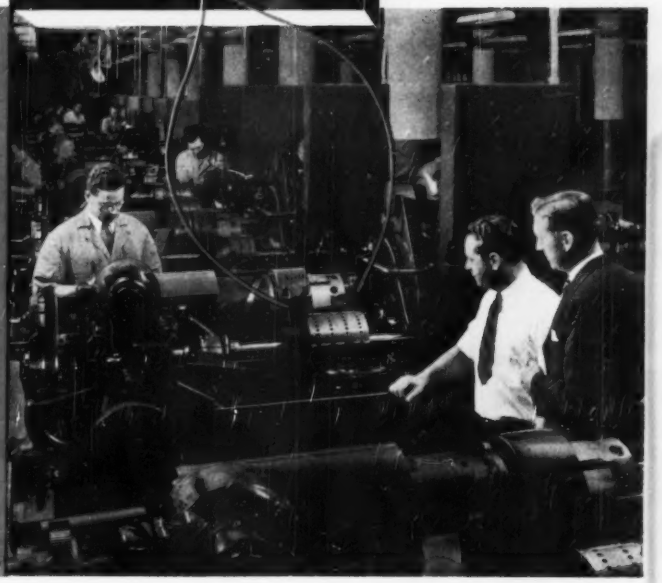


Screw machine Superintendent consults with a Gulf Lubrication Engineer (right) on the performance of Gulf Stainless Cutting Oil B.

with **GULF STAINLESS CUTTING OIL B"**

says

this Screw machine Superintendent.



"We have stepped up production on all of our single spindle automatic screw machines since we switched to Gulf Stainless Cutting Oil B," says the screw machine Superintendent of a New England manufacturing plant. "We now take heavier cuts at increased feeds—and we're getting unusually good finishes for this type of job."

A typical report from the scores of plants which have improved production and tool life through the use of Gulf Stainless Cutting Oil B. In addition to its outstanding performance as a cutting oil, Gulf Stainless Cutting Oil B also provides excellent lubrication for the working parts of machine tools. Thus it serves as an ideal dual-purpose oil in machines using one oil as both lubricant and cutting oil. This quality oil is non-corrosive to finished metal surfaces.

Ask a Gulf Lubrication Engineer to demonstrate the advantages of Gulf Stainless Cutting Oils and other quality cutting oils from the complete Gulf line in your shop. Write, wire, or phone your nearest Gulf office today.

Machining costs go down when the most suitable cutting oil is used for each type of job. A Gulf Lubrication Engineer can give you effective help on this important phase of machine shop operation.

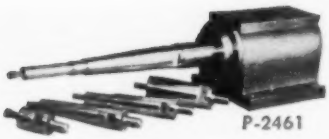
Gulf Oil Corporation · Gulf Refining Company

Division Sales Offices:

Boston · New York · Philadelphia · Pittsburgh · Atlanta
New Orleans · Houston · Louisville · Toledo

GULF INDUSTRIAL LUBRICATION

P-5781-2


P-2461

P-32T

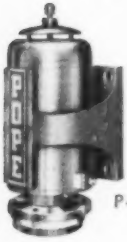
POPE
PRECISION SPINDLES

Out of these and dozens of others — skilfully engineered, *precision* built, with *sealed-in lubrication* — you will find the motorised or belt driven Spindles that will produce better work and more of it from your machines.

Name the Spindle number or describe the application and we'll mail you complete specifications and estimates.

P-1461

P-2463

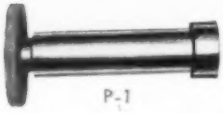

P-2500

P-1004

P-1932

P-3521

P-2514


P-1

P-2652

P-5101

P-5642

P-274

P-666

P-1681

P-4721

P-1744

P-5061

No. 61

POPE

TRADE MARK REG. U.S. PAT. OFF.

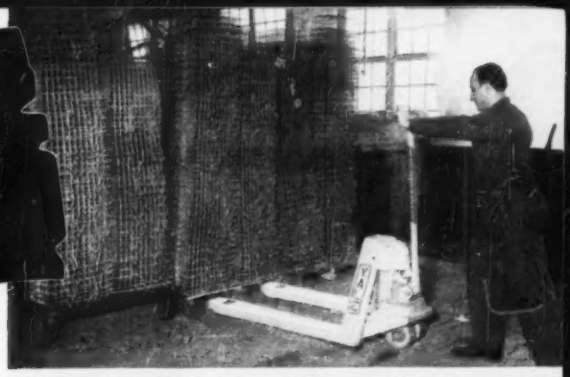
POPE MACHINERY CORPORATION

ESTABLISHED 1920

261 RIVER STREET • HAVERHILL, MASSACHUSETTS

BUILDERS OF PRECISION SPINDLES

TAKE HIGH HANDLING COSTS FOR A "RIDE!"

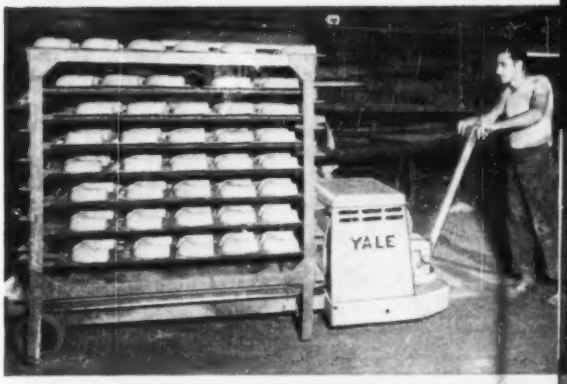


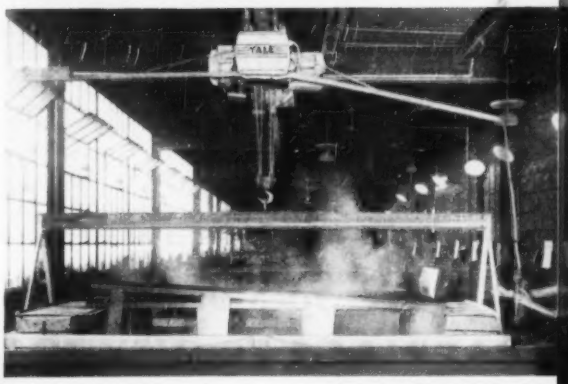
Handling adds nothing but cost to your products. By eliminating wasteful *rehandling*, you cut those costs substantially.

How to do it? Simply integrate efficient material handling machinery with the most practical handling system for *your* operations. Here's proof of what cost reductions can be made: a rubber company now saves $80,000 a year in a single department. Material transfer costs were lowered 25% by a publisher. $5.00 to $7.00 per ton was cut from handling costs by a casting manufacturer.

Whatever you lift, move and weigh, Yale Hoists, Trucks and Scales will give you handling economy you never thought possible. These cost-cutting tools handle enormous tonnage at a pace that keeps receiving, processing, warehousing and shipping at the peak of efficiency. They save a tremendous amount of human effort, improve safety conditions, and contribute greatly to worker morale.

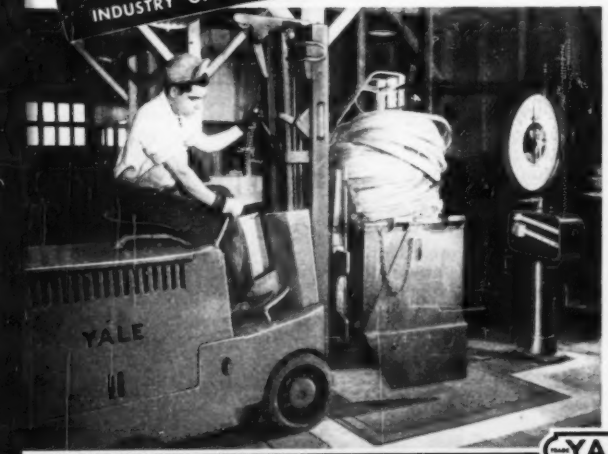
See your telephone book for the name of the nearby Yale representative. Or write direct to headquarters for help in taking your handling costs for a "ride." Do it today.





YALE
TOOLS THAT KEEP INDUSTRY "ON THE MOVE"

THE YALE & TOWNE MANUFACTURING CO.
Department L-31
Roosevelt Boulevard
Philadelphia 15, Pa.



YALE

MATERIAL HANDLING MACHINERY · hoists · hand and electric · trucks · hand lift and power · industrial dial scales

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE *Lo-swing* PEOPLE" SENECA FALLS, NEW YORK

NEW *Lo-swing* LATHE OFFERS UNLIMITED CARRIAGE TRAVEL FOR LONG OR SHORT CUTS

Model AP, Lo-swing's new Semi-Automatic Lathe is designed to fill the demand for a modern, high-speed, multiple-tool turning lathe, which can be set up readily and operated by unskilled labor, and in which maximum carriage travel is provided. It is ideal for shaft work involving long shoulder lengths where overlapping of cuts is not desirable, and equally suited to short run jobs requiring heavy stock removal where limited quantities do not justify set-up time on fully-automatic, closed-cycle machines.

Model AP is rugged in design and heavily constructed throughout to take full advantage of the tremendous cutting capacity of modern sintered carbide tools at high cutting speeds and coarse feeds. Its carriage travel is limited only by bed length and is accomplished through a unique balanced, twin-pinion carriage feed mechanism which cuts the unit pressure on rack and pinion teeth in half. Carriage cross slides are power operated and individually controlled. Hinged-type roller steady rests prevent the work from springing away from the tools. Other features include: Automatic feed throwout coupled with Automatic tool relief; Rapid traverse movements for longitudinal carriage feed and cross slides and for the Automatic Back Attachment.

Investigate the cost-cutting possibilities of the newest Lo-swing Lathe. Write for Bulletin AP-49 today.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

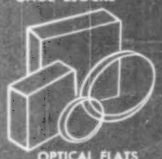
PRODUCTION COSTS ARE LOWER WITH *Lo-swing*

DoALL's NEW "BURR-PROOF" GAGE BLOCKS

Reg. Trade-mark

COMPARATOR

GAGE BLOCKS

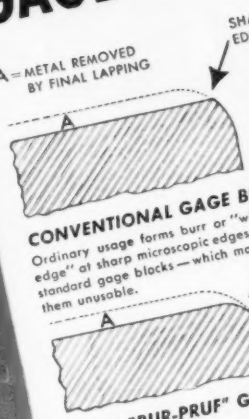


OPTICAL FLATS

INSPECTION INSTRUMENTS

MOBILE UNIT

AUTOMATIC INSPECTION


A = METAL REMOVED BY FINAL LAPPING
SHARP EDGE
A
CONVENTIONAL GAGE BLOCKS
Ordinary usage forms burr or "wire edge" at sharp microscopic edges of standard gage blocks — which makes them unusable.
BLENDED RADIUS NO EDGE
A

DoALL "BUR-PRUF" GAGE BLOCKS

The Secret of "Re-Rounded" Edges

Now, without added cost, you can have the new DoALL "BUR-PRUF" gage blocks that last twice as long as other standard blocks. Think of the great savings in replacement costs, fewer rejects and better quality products! Developed and used exclusively by DoALL, burr-proofing is the latest major achievement in gage block history. It "re-rounds" the edges of the blocks to prevent formation of microscopic burrs caused by ordinary usage. Burred edges are a major reason for discarding gage blocks — even a burr only 2 millionth inch can make a block unsuitable.

Although gage makers round the edges of the blocks to prevent burrs, the purpose of rounding is defeated by final lapping, which produces unwanted sharp edges. These become burred by the slight shocks and jars of normal handling. Mechanical operations to re-round the edges after lapping are avoided as they invariably cause distortion. Therefore the sharp edges left have been tolerated as a necessary evil — until the new DoALL process that "re-rounds" edges without distortion.

100% LONGER LIFE!

Part of DoALL's Integrated Inspection System

All DoALL gage blocks are burr-proofed. They are the key units of the integrated inspection equipment that DoALL manufactures for industry — from simple and quickly assembled precision gages to fully automatic inspection machines that inspect, count and sort parts at an amazing speed of 3,000 to 12,000 per hour.

FREE LOAN OF SOUND MOVIE FILM

For industrial education groups. 25-minute, 16 mm. Subject: "Gage Blocks and Accessories".

The DoALL Company

Reg. U. S. Pat. Off.

Des Plaines, Illinois

REPRESENTATIVES IN 56 COUNTRIES

DoALL STORES IN KEY CITIES

TO SHOP EXECUTIVES

Write for free copy of "QUALITY CONTROL" a book that covers modern inspection.

HOUGHTON'S HYDRO-DRIVE • HOUGHTON'S HYDRO-DRIVE

FORTIFIED 4 WAYS

. . . to give you better hydraulic performance

1. OXIDATION STABILITY	Increasing service life of oil by fortifying it to withstand high pressures, heat, moisture and agitation.
2. GUM SOLVENCY	Ability to hold gums and sludges in suspension, assuring longer service life and smoother hydraulic operation.
3. CORROSION RESISTANCE	Additive treatment to protect against formation of rust in system.
4. FILM STRENGTH	Reducing wear on working surfaces, which means reduced maintenance and higher pump efficiency.

Longer oil life means longer machine life at lower maintenance cost. That's why HYDRO-DRIVE excels. For technical bulletin write

E. F. HOUGHTON & CO.

303 W. Lehigh Ave., Phila. 33, Pa.

HOUGHTON'S HYDRO-DRIVE • HOUGHTON'S HYDRO-DRIVE
HOUGHTON'S HYDRO-DRIVE • HOUGHTON'S HYDRO-DRIVE

Black & Decker
QUALITY in the SANDER

1 *Full-power B&D-built universal motor.*

2 *A perfectly balanced tool; easy for operator to control for light or heavy work.*

3 *Heat-treated, spiral beveled gears, match-lapped for smoothness, spline-mounted for strength.*

4 *Commutator, bearings and switch sealed against abrasive dust or dirt from the work.*

5 *All ball-bearings on steel inserts and grease-sealed for longer life. Needle roller bearing at back end of spindle.*

6 *Patented spindle lock for speed and ease in changing accessories.*

Cuts Surfacing Costs on Your Jobs!

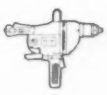
Speedy, powerful Black & Decker Portable Electric Sanders will save you time, labor and money . . . whether you use them for fast, rough sanding; satin-smooth finishing; grinding down welds; removing rust; semi-finishing lumber; or doing 100-and-1 other jobs! Thousands of users are sold on their fine engineering, longer-wearing parts and husky construction. Check their job-tested features at the left. Remember: The work you get out of Sanders depends on *what's built into them!*

Versatile B&D Sanders drive abrasive discs, "Whirlwind" Wire Cup Brushes, saucer grinding wheels and rotary gouging and planing heads. You have your choice of three models: 7" Standard ($67); 7" Heavy-Duty ($76); 9" Heavy-Duty ($92). Ask your nearby Black & Decker Distributor for a free demonstration. Write for detailed catalog of over 100 cost-cutting Portable Electric Tools to: The Black & Decker Mfg. Co., 616 Pennsylvania Avenue, Towson 4, Maryland.

LEADING DISTRIBUTORS EVERYWHERE SELL

Black & Decker

PORTABLE ELECTRIC TOOLS



DRILLS

BENCH GRINDERS

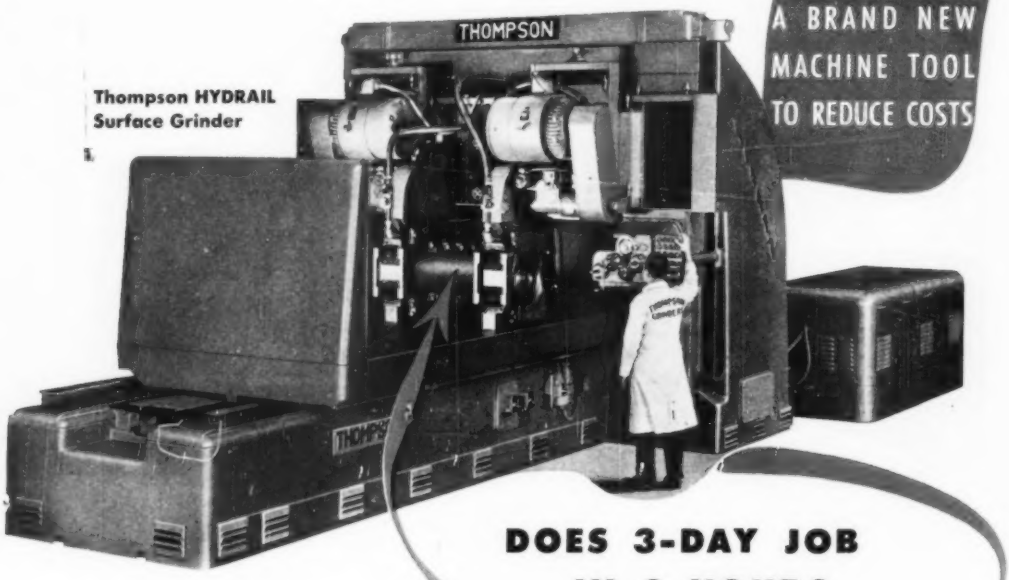
PORTABLE GRINDERS

SAWS

The widest surface grinder ever built

SPEEDS PRODUCTION ON LARGE WORK

Grinds to tolerance of .0008 in. over area 72" x 120"


THOMPSON
A BRAND NEW MACHINE TOOL TO REDUCE COSTS
Thompson HYDRAIL Surface Grinder
DOES 3-DAY JOB IN 2 HOURS
ON THIS LOCOMOTIVE BEARING HOUSING

CAN FINISH WORK FASTER AND BETTER THAN OTHER MACHINING METHODS COMMONLY USED IN MANY INDUSTRIAL APPLICATIONS

Thompson HYDRAIL Surface Grinders with bridge type construction open new fields for surface grinding. These machines are now available for production and maintenance jobs on large work in aircraft, automotive, railroad and other industries.

For example, the HYDRAIL Machine illustrated, reduces finishing time of massive diesel-locomotive bearing housing wear-strips from three days to a matter of two hours . . . grinding tolerance of .0008 inch over an area 72" wide by 120" long.

In other industrial applications large dies can be sharpened on a Thompson HYDRAIL Machine without stripping down and all die surfaces will be in correct relation.

Thompson HYDRAIL Surface Grinders are made to your specifications with one or two wheel heads. The capacity of the machine illustrated is 72" x 36" x 120". It has two wheel heads so that two operators can grind from separate controls simultaneously.

Table speed is adjustable from 10 to 100 feet per minute. The machine weighs approximately 130,000 pounds. Controls are both automatic push button and manual. Wheel heads may be built horizontally or vertically or both, if two wheel heads are desired. Wheel head cross feed ranges from $\frac{1}{8}$ to 6 inches per table reversal. Spindle bearings are silver lined and pressure lubricated. All bearings are totally sealed. This machine provides for the utmost flexibility of operation and simplicity of control. *Write today for other details or information concerning possible application in your production work.*

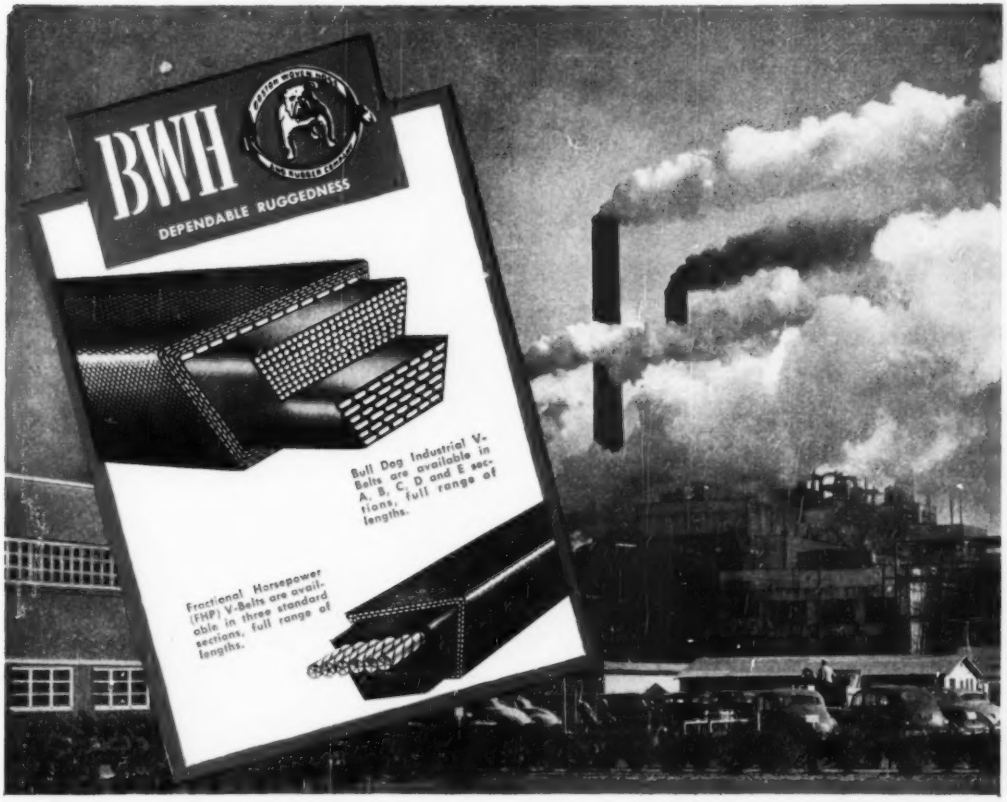
The only manufacturer of a complete range of heavy duty and light duty surface and contour grinders for industry.

Thompson SURFACE Grinders

The Thompson Grinder Company, Springfield, Ohio

Copyright 1949—The Thompson Grinder Co.

Address Dept. 10


BWH
DEPENDABLE RUGGEDNESS
Bull Dog Industrial V-Belts are available in A, B, C, D and E sections, full range of lengths.
Fractional Horsepower (FHP) V-Belts are available in three standard sections, full range of lengths.

HERE'S WHY ALL INDUSTRIES ARE TURNING TO NEW BULL DOG V-BELTS

Industrial experts agree that the most important factor in improving productivity is better equipment. As a result, they're scanning new products eagerly and giving them thorough workouts. And BULL DOG V-BELTS are among the newcomers that have more than won their spurs in every trial.

It's typical of the 70-year BWH fame for precision that these V-Belts weren't put on the market till they'd been exhaustively tested in the field. BULL DOGS proved they had real tenacity. They gripped tighter, slipped less, stayed on the job longer. And here's the construction that accounts for this superior performance:

1. Exclusive Bull Dog Cord Section has higher tensile strength—able to carry the load and absorb shock.
2. Low Stretch, because exclusive Bull Dog Cords are processed in a new way. As a result there's less slippage, fewer adjustments, longer life.
3. Cool Running—thanks to quality-controlled compounds developed in BWH laboratories, which don't crack or deteriorate under severe flexing.
4. Wear-Resistant covers—made of bias-cut heavy fabric to protect heart of belt from dirt, grease, moisture.

Specify Bull Dog V-Belts on all replacements. You'll find they mean "More Power To You" every time.

HAVE YOU A JOB WHERE STAMINA COUNTS?

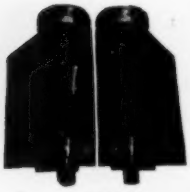
Bring us your toughest problems . . . we're specialists in solving them. Consult your nearest BWH distributor or write to us direct.

Another Quality Product of

BOSTON WOVEN HOSE & RUBBER COMPANY

Distributors in all principal cities

PLANT: CAMBRIDGE, MASS., U. S. A. • P. O. BOX 1071, BOSTON 3, MASS.



P-5781-2

P-2461

P-32T

POPE
PRECISION SPINDLES

P-1461

P-2463

P-2500

P-1004

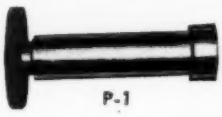
P-1932

P-3521

P-2514

P-2652

P-5101



P-1

P-274

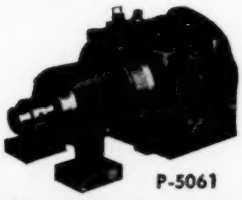
P-666

P-5642

P-1681

P-4721

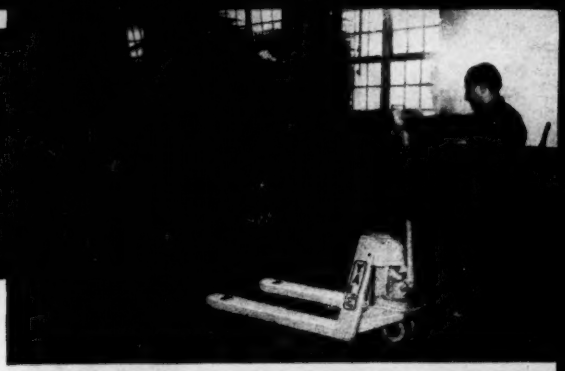
P-1744



P-5061

POPE

TAKE HIGH HANDLING COSTS FOR A "RIDE!"

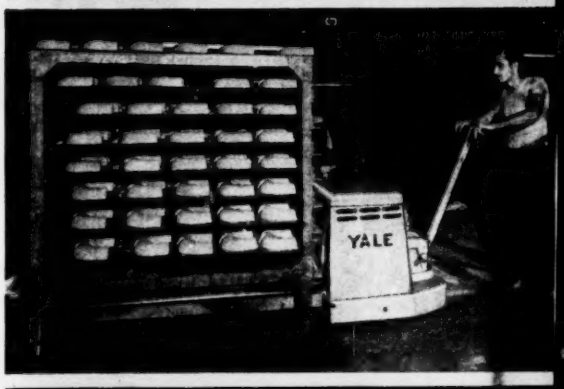


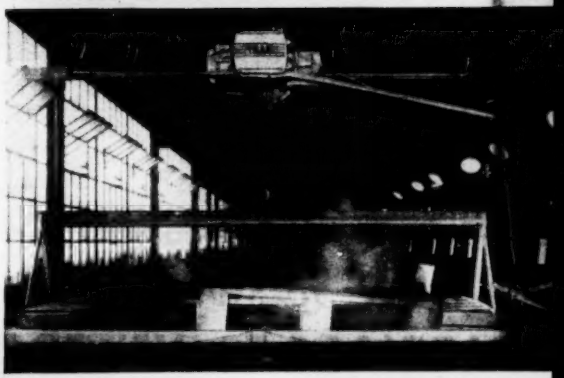
Handling adds nothing but cost to your products. By eliminating wasteful *rehandling*, you cut those costs substantially.

How to do it? Simply integrate efficient material handling machinery with the most practical handling system for *your* operations. Here's proof of what cost reductions can be made: a rubber company now saves $80,000 a year in a single department. Material transfer costs were lowered 25% by a publisher. $5.00 to $7.00 per ton was cut from handling costs by a casting manufacturer.

Whatever you lift, move and weigh, Yale Hoists, Trucks and Scales will give you handling economy you never thought possible. These cost-cutting tools handle enormous tonnage at a pace that keeps receiving, processing, warehousing and shipping at the peak of efficiency. They save a tremendous amount of human effort, improve safety conditions, and contribute greatly to worker morale.

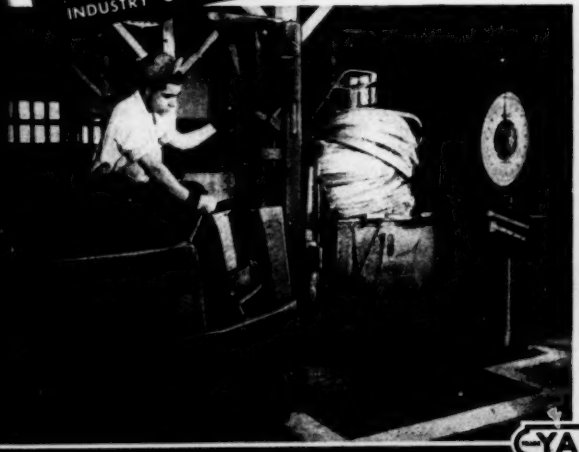
See your telephone book for the name of the nearby Yale representative. Or write direct to headquarters for help in taking your handling costs for a "ride." Do it today.

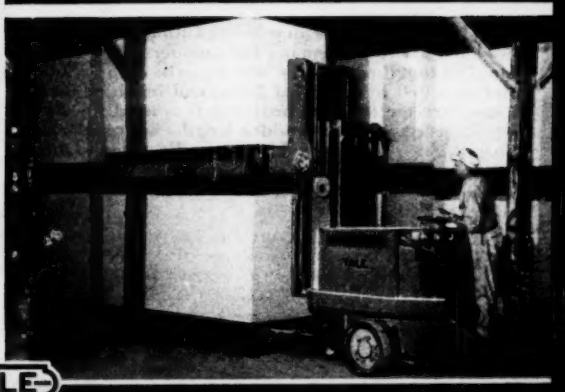




YALE
TOOLS THAT KEEP INDUSTRY ON THE MOVE

THE YALE & TOWNE MANUFACTURING CO.
Department L-31
Roosevelt Boulevard
Philadelphia 15, Pa.





YALE

MATERIAL HANDLING MACHINERY — hoists — hand and electric — trucks — hand lift and power — industrial dial scales

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE *Lo-swing* PEOPLE" SENECA FALLS, NEW YORK

NEW *Lo-swing* LATHE OFFERS UNLIMITED CARRIAGE TRAVEL FOR LONG OR SHORT CUTS

Model AP, Lo-swing's new Semi-Automatic Lathe is designed to fill the demand for a modern, high-speed, multiple-tool turning lathe, which can be set up readily and operated by unskilled labor, and in which maximum carriage travel is provided. It is ideal for shaft work involving long shoulder lengths where overlapping of cuts is not desirable, and equally suited to short run jobs requiring heavy stock removal where limited quantities do not justify set-up time on fully-automatic, closed-cycle machines.

Model AP is rugged in design and heavily constructed throughout to take full advantage of the tremendous cutting capacity of modern sintered carbide tools at high cutting speeds and coarse feeds. Its carriage travel is limited only by bed length and is accomplished through a unique balanced, twin-pinion carriage feed mechanism which cuts the unit pressure on rack and pinion teeth in half. Carriage cross slides are power operated and individually controlled. Hinged-type roller steady rests prevent the work from springing away from the tools. Other features include: Automatic feed throwout coupled with Automatic tool relief; Rapid traverse movements for longitudinal carriage feed and cross slides and for the Automatic Back Attachment.

Investigate the cost-cutting possibilities of the newest Lo-swing Lathe. Write for Bulletin AP-49 today.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH *Lo-swing*

DoALL's NEW "BURR-PROOF" GAGE BLOCKS

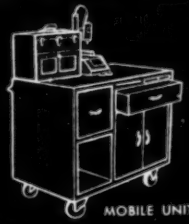
Reg. Trade-mark

COMPARATOR

GAGE BLOCKS

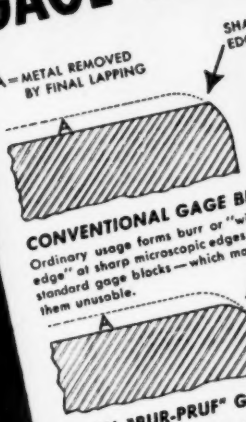
OPTICAL FLATS

INSPECTION INSTRUMENTS



MOBILE UNIT

AUTOMATIC INSPECTION


A = METAL REMOVED BY FINAL LAPPING
SHARP EDGE
A
CONVENTIONAL GAGE BLOCKS
Ordinary usage forms burr or "wire edge" at sharp microscopic edges of standard gage blocks — which makes them unusable.
BLENDED RADIUS NO EDGE
A

DoALL "BUR-PRUF" GAGE BLOCKS

The Secret of "Re-Rounded" Edges

Now, without added cost, you can have the new DoALL "BUR-PRUF" gage blocks that last twice as long as other standard blocks. Think of the great savings in replacement costs, fewer rejects and better quality products! Developed and used exclusively by DoALL, burr-proofing is the latest major achievement in gage block history. It "re-rounds" the edges of the blocks to prevent formation of microscopic burrs caused by ordinary usage. Burred edges are a major reason for discarding gage blocks — even a burr only 2 millionth inch can make a block unsuitable.

Although gage makers round the edges of the blocks to prevent burrs, the purpose of rounding is defeated by final lapping, which produces unwanted sharp edges. These become burred by the slight shocks and jars of normal handling. Mechanical operations to re-round the edges after lapping are avoided as they invariably cause distortion. Therefore the sharp edges left have been tolerated as a necessary evil — until the new DoALL process that "re-rounds" edges without distortion.

100% LONGER LIFE!

Part of DoALL's Integrated Inspection System

All DoALL gage blocks are burr-proofed. They are the key units of the integrated inspection equipment that DoALL manufactures for industry — from simple and quickly assembled precision gages to fully automatic inspection machines that inspect, count and sort parts at an amazing speed of 3,000 to 12,000 per hour.

FREE LOAN OF SOUND MOVIE FILM
For industrial education groups. 25 minutes 16 mm. subjects: "Gage Blocks and Accessories"

The DoALL Company

REPRESENTATIVES IN 56 COUNTRIES

DoALL STORES IN KEY CITIES

Des Plaines Illinois

HOUGHTON'S HYDRO-DRIVE • HOUGHTON'S HYDRO-DRIVE

FORTIFIED 4 WAYS

. . . to give you better hydraulic performance

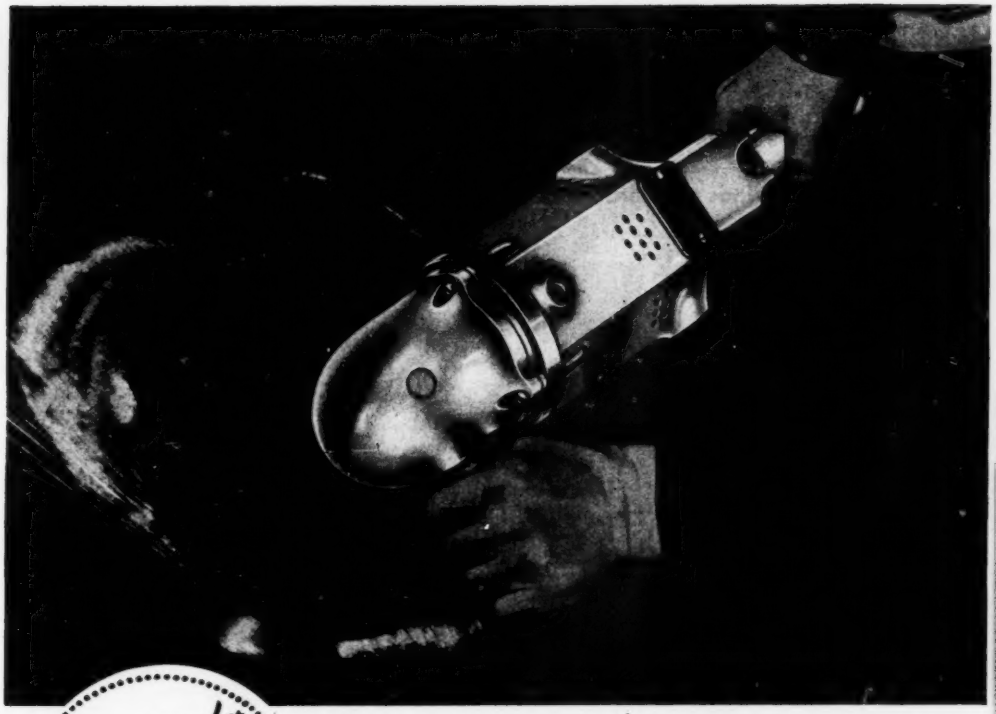
1. OXIDATION STABILITY	Increasing service life of oil by fortifying it to withstand high pressures, heat, moisture and agitation.
2. GUM SOLVENCY	Ability to hold gums and sludges in suspension, assuring longer service life and smoother hydraulic operation.
3. CORROSION RESISTANCE	Additive treatment to protect against formation of rust in system.
4. FILM STRENGTH	Reducing wear on working surfaces, which means reduced maintenance and higher pump efficiency.

Longer oil life means longer machine life at lower maintenance cost. That's why HYDRO-DRIVE excels. For technical bulletin write

E. F. HOUGHTON & CO.

303 W. Lehigh Ave., Phila. 33, Pa.

HOUGHTON'S HYDRO-DRIVE • HOUGHTON'S HYDRO-DRIVE



Black & Decker QUALITY in the SANDER

1 *Full-power B&D-built universal motor.*

2 *A perfectly balanced tool, easy for operator to control for light or heavy work.*

3 *Heat-treated, spiral beveled gears, match-lapped for smoothness, spline-mounted for strength.*

4 *Commutator, bearings and switch sealed against abrasive dust or dirt from the work.*

5 *All ball-bearings on steel inserts and grease-sealed for longer life. Needle roller bearing at back end of spindle.*

6 *Patented spindle lock for speed and ease in changing accessories.*

Cuts Surfacing Costs on Your Jobs!

Speedy, powerful Black & Decker Portable Electric Sanders will save you time, labor and money . . . whether you use them for fast, rough sanding; satin-smooth finishing; grinding down welds; removing rust; semi-finishing lumber; or doing 100-and-1 other jobs! Thousands of users are sold on their fine engineering, longer-wearing parts and husky construction. Check their job-tested features at the left. Remember: The work you get out of Sanders depends on *what's built into them!*

Versatile B&D Sanders drive abrasive discs, "Whirlwind" Wire Cup Brushes, saucer grinding wheels and rotary gouging and planing heads. You have your choice of three models: 7" Standard ($67); 7" Heavy-Duty ($76); 9" Heavy-Duty ($92). Ask your nearby Black & Decker Distributor for a free demonstration. Write for detailed catalog of over 100 cost-cutting Portable Electric Tools to: The Black & Decker Mfg. Co., 616 Pennsylvania Avenue, Towson 4, Maryland.

LEADING DISTRIBUTORS EVERYWHERE SELL

Black & Decker

PORTABLE ELECTRIC TOOLS

DRILLS

BENCH GRINDERS

PORTABLE GRINDERS

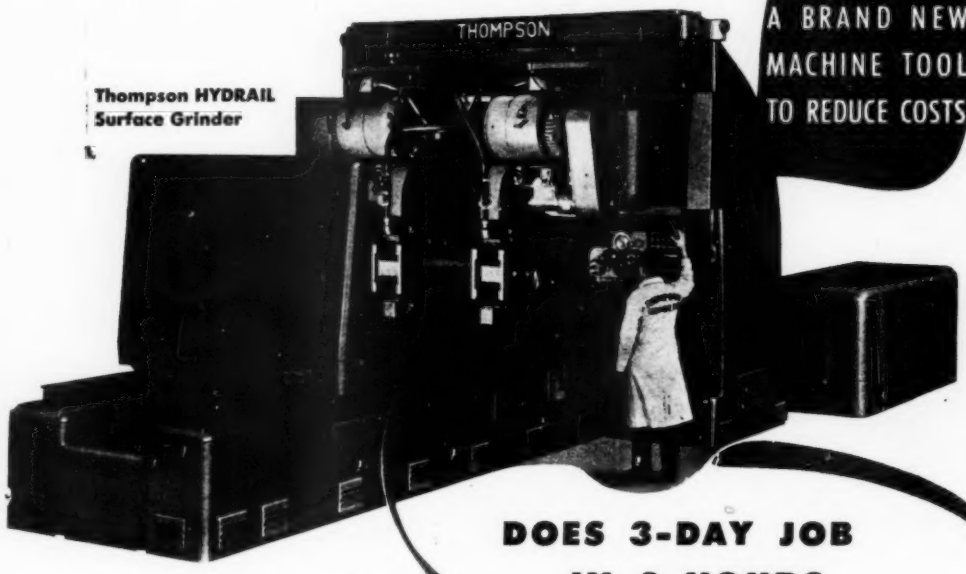
SAWS

The widest surface grinder ever built

SPEEDS PRODUCTION ON LARGE WORK

Grinds to tolerance of .0008 in. over area 72" x 120"

A BRAND NEW MACHINE TOOL TO REDUCE COSTS



Thompson HYDRAIL Surface Grinder

DOES 3-DAY JOB IN 2 HOURS

ON THIS LOCOMOTIVE BEARING HOUSING

CAN FINISH WORK FASTER AND BETTER THAN OTHER MACHINING METHODS COMMONLY USED IN MANY INDUSTRIAL APPLICATIONS

Thompson HYDRAIL Surface Grinders with bridge type construction open new fields for surface grinding. These machines are now available for production and maintenance jobs on large work in aircraft, automotive, railroad and other industries.

For example, the HYDRAIL Machine illustrated, reduces finishing time of massive diesel-locomotive bearing housing wear-strips from three days to a matter of two hours . . . grinding tolerance of .0008 inch over an area 72" wide by 120" long.

In other industrial applications large dies can be sharpened on a Thompson HYDRAIL Machine without stripping down and all die surfaces will be in correct relation.

Thompson HYDRAIL Surface Grinders are made to your specifications with one or two wheel heads. The capacity of the machine illustrated is 72" x 36" x 120". It has two wheel heads so that two operators can grind from separate controls simultaneously.

Table speed is adjustable from 10 to 100 feet per minute. The machine weighs approximately 130,000 pounds. Controls are both automatic push button and manual. Wheel heads may be built horizontally or vertically or both, if two wheel heads are desired. Wheel head cross feed ranges from 1/8 to 6 inches per table reversal. Spindle bearings are silver lined and pressure lubricated. All bearings are totally sealed. This machine provides for the utmost flexibility of operation and simplicity of control. *Write today for other details or information concerning possible application in your production work.*

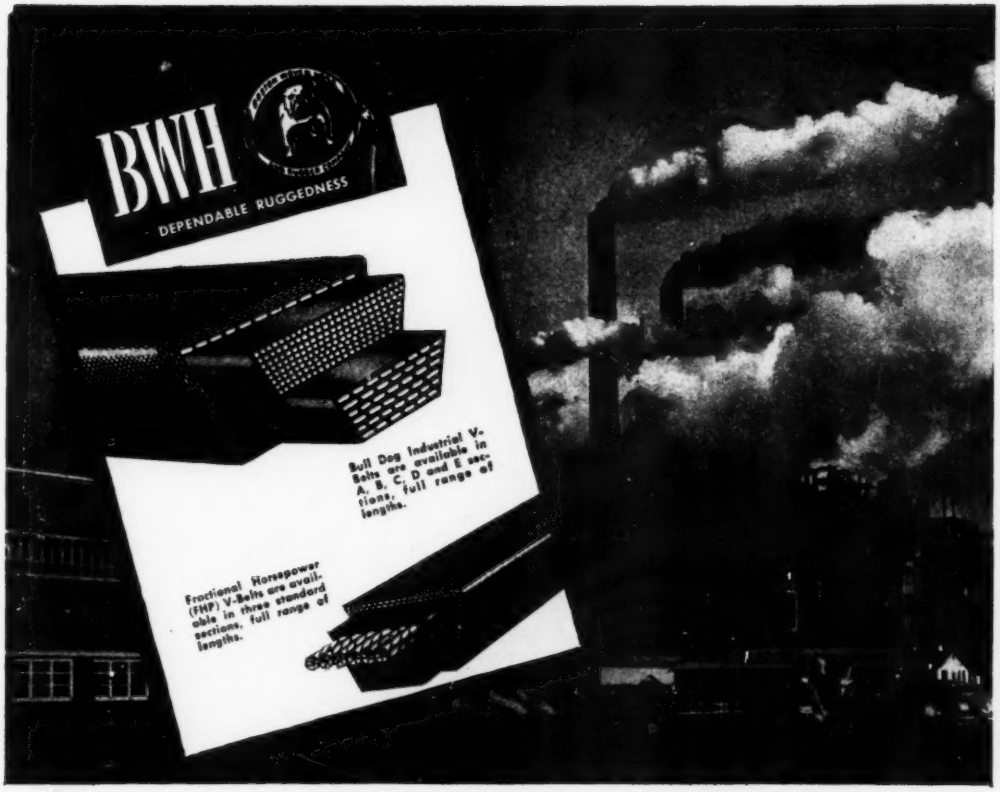
The only manufacturer of a complete range of heavy duty and light duty surface and contour grinders for industry.

Thompson SURFACE Grinders

The Thompson Grinder Company, Springfield, Ohio

Copyright 1949—The Thompson Grinder Co.

Address Dept. 10


BWH
DEPENDABLE RUGGEDNESS
Bull Dog Industrial V-Belts are available in A, B, C, D and E sections, full range of lengths.
Fractional Horsepower (FHP) V-Belts are available in three standard sections, full range of lengths.

HERE'S WHY ALL INDUSTRIES ARE TURNING TO NEW BULL DOG V-BELTS

Industrial experts agree that the most important factor in improving productivity is better equipment. As a result, they're scanning new products eagerly and giving them thorough workouts. And BULL DOG V-BELTS are among the newcomers that have more than won their spurs in every trial.

It's typical of the 70-year BWH fame for precision that these V-Belts weren't put on the market till they'd been exhaustively tested in the field. BULL DOGS proved they had real tenacity. They gripped tighter, slipped less, stayed on the job longer. And here's the construction that accounts for this superior performance:

1. Exclusive Bull Dog Cord Section has higher tensile strength—able to carry the load and absorb shock.
2. Low Stretch, because exclusive Bull Dog Cords are processed in a new way. As a result there's less slippage, fewer adjustments, longer life.
3. Cool Running—thanks to quality-controlled compounds developed in BWH laboratories, which don't crack or deteriorate under severe flexing.
4. Wear-Resistant covers—made of bias-cut heavy fabric to protect heart of belt from dirt, grease, moisture.

Specify Bull Dog V-Belts on all replacements. You'll find they mean "More Power To You" every time.

HAVE YOU A JOB WHERE STAMINA COUNTS?

Bring us your toughest problems . . . we're specialists in solving them. Consult your nearest BWH distributor or write to us direct.

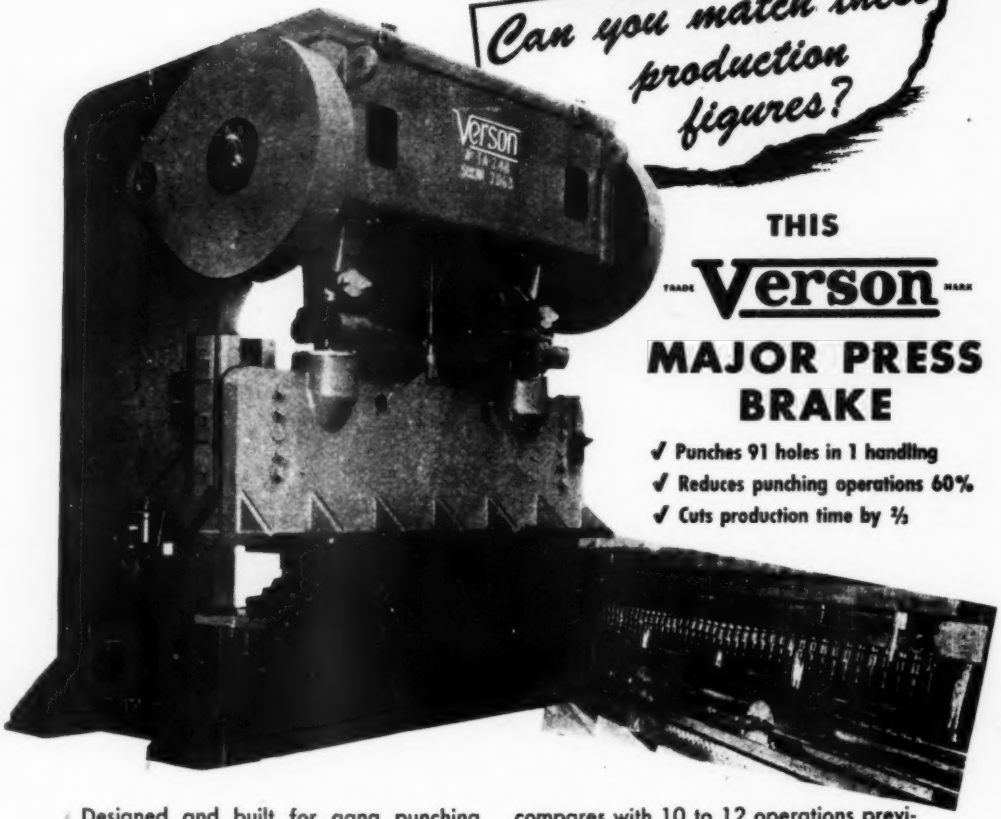
Another Quality Product of

BOSTON WOVEN HOSE & RUBBER COMPANY

Distributors in all principal cities

PLANT: CAMBRIDGE, MASS. U. S. A. • P. O. BOX 1071, BOSTON 3, MASS.

Can you match these production figures?



THIS

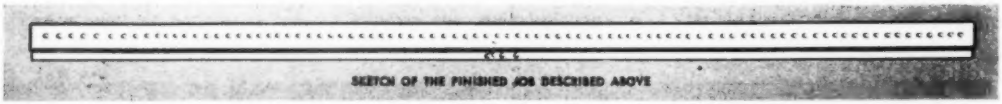
TRADE Verson MARK

MAJOR PRESS BRAKE

- ✓ Punches 91 holes in 1 handling
- ✓ Reduces punching operations 60%
- ✓ Cuts production time by ⅓

Designed and built for gang punching operations, the Verson Major Press Brake illustrated above has made possible tremendous savings in time and material handling for a manufacturer of harvesting combines and allied equipment. The part produced in this machine is an 8′ 4″ long angle bar 2″ x 2″, ⅜″ thick which requires 91 ⅜″ holes. With the aid of air cylinders to straighten and clamp the piece (see close-up of die above) the Verson Brake punches all 91 holes in one handling. This compares with 10 to 12 operations previously required . . . time per piece is cut to ⅓ of previous requirements.

And this is not an isolated case, either — it is typical of how scores of manufacturers using modern equipment and materials, engineered by Verson, have slashed production costs. Whatever your metal forming or punching problem we'd like the opportunity to show you how Verson can speed your production and cut costs. *Write today!*



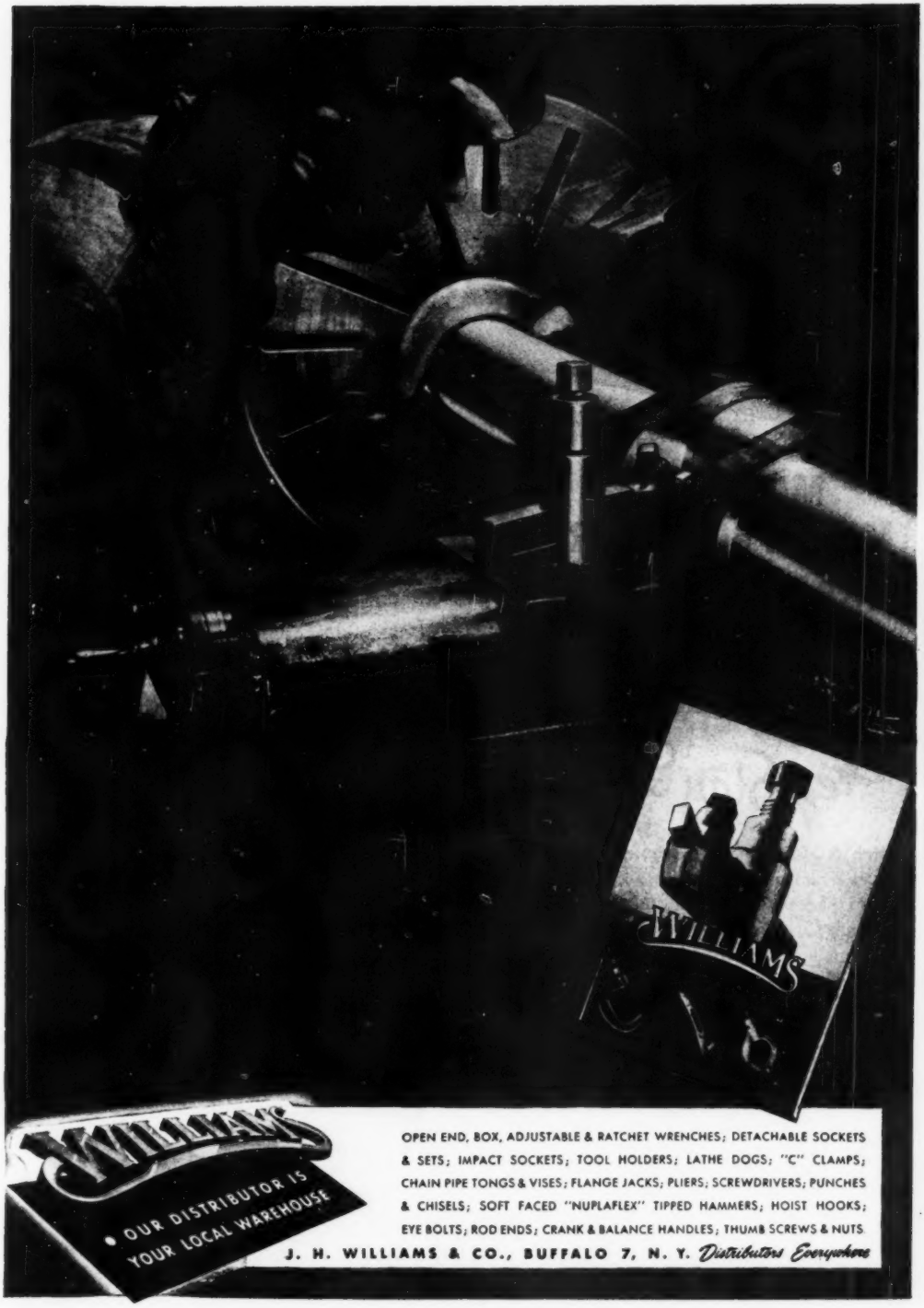
SKETCH OF THE FINISHED JOB DESCRIBED ABOVE

VERSON ALLSTEEL PRESS COMPANY

9316 South Kenwood Avenue, Chicago 19, Illinois — Holmes Street and Ledbetter Drive, Dallas 8, Texas

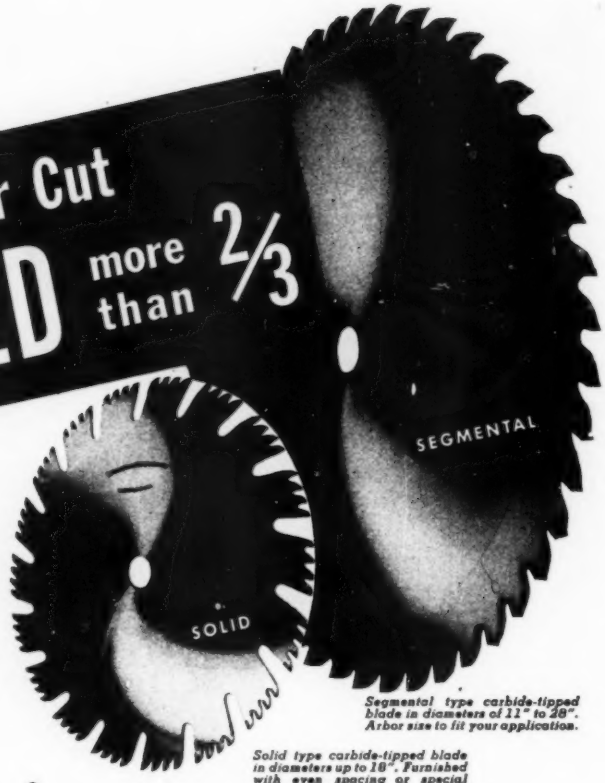
A VERSON PRESS FOR EVERY JOB FROM 60 TONS UP!

BLANKING PRESSES • FORGING PRESSES • DRAWING PRESSES • HYDRAULIC PRESSES
PRESS BRAKES • DIES • DIE CUSHIONS


WILLIAMS
WILLIAMS
• OUR DISTRIBUTOR IS YOUR LOCAL WAREHOUSE
OPEN END, BOX, ADJUSTABLE & RATCHET WRENCHES; DETACHABLE SOCKETS & SETS; IMPACT SOCKETS; TOOL HOLDERS; LATHE DOGS; "C" CLAMPS; CHAIN PIPE TONGS & VISES; FLANGE JACKS; PLIERS; SCREWDRIVERS; PUNCHES & CHISELS; SOFT FACED "NUPLAFLEX" TIPPED HAMMERS; HOIST HOOKS; EYE BOLTS; ROD ENDS; CRANK & BALANCE HANDLES; THUMB SCREWS & NUTS
J. H. WILLIAMS & CO., BUFFALO 7, N. Y. Distributors Everywhere

Cost per Cut REDUCED more than 2/3

with MOTCH & MERRYWEATHER CARBIDE-TIPPED BLADES



Segmental type carbide-tipped blade in diameters of 11" to 28". Arbor size to fit your application.

Solid type carbide-tipped blade in diameters up to 18". Furnished with even spacing or special grouping of teeth.

They Stay Sharp Longer!

Motch & Merryweather extends its line of saw blades by adding carbide-tipped and cast-alloy-tipped segmental (11" to 28" diameter) and solid (up to 18" diameter) types. Both types can be furnished with the well known Triple-Chip grind or any special grind required by your job —in the one right grade of carbide for superlative results... M. & M. *tipped* blades wear longer. Fewer resharpenings; more cuts per grind. Superb finishes minimize secondary finishing operations. Savings in time and money are evident from the start. *Our technical staff will be glad to study your exact requirements.*

TRIPLE-CHIP GRIND
for the sawing of non-ferrous metals, such as aluminum, manganese bronze, copper and magnesium, as well as ferrous milling applications of various descriptions.

SPECIAL GRIND
for sawing phenolic and acrylic plastics, resinoid-impregnated materials, plywoods, asbestos-base, rubber-base and many other kinds of non-ferrous materials.

CUT SAWING COST OVER 2/3!

M. & M. Carbide-Tipped Blade, 1350 cuts per grind. 10 grinds give 13,500 cuts; 4.5¢ per cut.

Conventional Steel Blade, 75 cuts per grind. 10 grinds give 750 cuts, or 14.5¢ per cut.

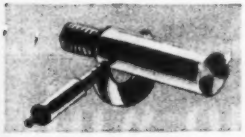
Ask for Bulletin 230-A

AT YOUR COMMAND • AN UNPARALLELED EXPERIENCE IN CIRCULAR SAWING

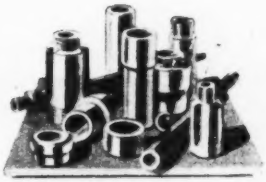
AXELSON FIRST CHOICE

MANAGEMENT EXECUTIVES AGREE a greater volume of production per man-hour and better quality work at less unit cost, is produced in their machine shops on AXELSON heavy-duty engine lathes.

MORE PRODUCTION PER DOLLAR CAPITAL INVESTMENT is assured with AXELSON lathes because of their faster speeds . . . greater ease of operation . . . ample reserve of smooth power at the cutting tool to handle any work without slowdown . . . scientific location of controls to minimize lost motion.

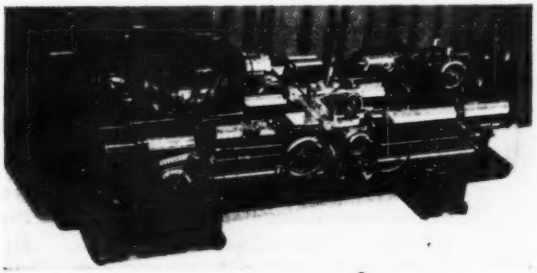


BETTER QUALITY WORK is produced on AXELSON lathes because of their in-built precisioned accuracy . . . extreme rigidity to maintain positive alignment . . . freedom from tool-damaging backlash and chatter.



WIDER RANGE OF APPLICATIONS means fewer machine tools needed to handle the work load . . . two-speed tailstock . . . built-in reverse clutch . . . designed for modern high-speed and carbide-tipped tooling.

LONGER LIFE—LESS MAINTENANCE with AXELSON lathes, cut depreciation and plant overhead . . . reduce to a minimum production shutdowns for maintenance or repair . . . provide years of added precision work at no replacement cost.



THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY

FREE

TO PLANT EXECUTIVES: *Complete illustrated literature tells the story of* AXELSON *lathes. Write today for your copy.*

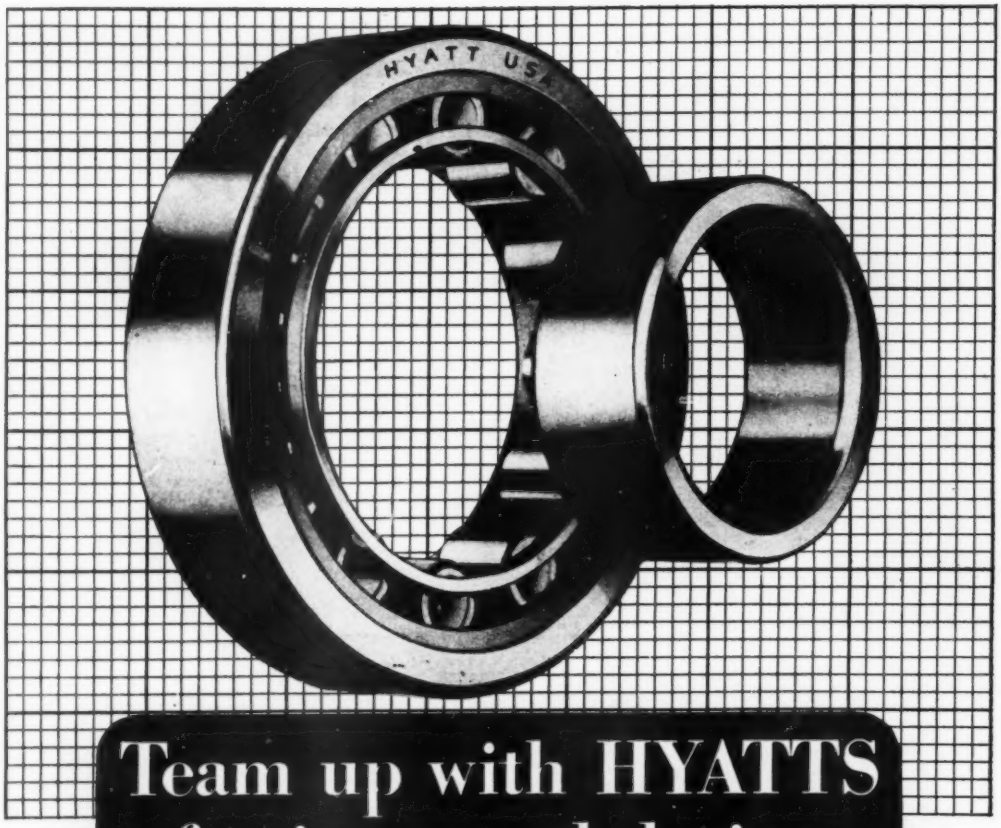
AXELSON *Lathes*

DEPENDABLE FOR A THIRD OF A CENTURY

AXELSON MANUFACTURING CO.

Los Angeles 11 • New York City 7 • St. Louis 16

AUTHORIZED DISTRIBUTORS IN ALL PRINCIPAL INDUSTRIAL CENTERS



Team up with HYATTS for improved design

IT'S not uncommon to find Hyatt Roller Bearings outlasting the machines and equipment for which they were selected.

For when better bearings like Hyatts are teamed up with better product design exceptional performance is to be expected.

With so many sizes and types of Hyatts to choose from—and with our many years of application experience at your service—we believe we can help you to keep your products always ahead of the procession, if given the opportunity to demonstrate. Put your problem up to the nearest Hyatt office. Hyatt Bearings Division, General Motors Corporation, Harrison, N. J., Chicago, Detroit, Pittsburgh and Oakland, Calif.

HYATT ROLLER BEARINGS

WHEN THERE'S HARD WORK AHEAD FOR STEEL PARTS
...use *Republic* Cold Drawn Alloy Steel Bars

When steel parts must carry heavy loads—or withstand severe shock and strain—or resist abrasion resulting from high speed or continuous use—you probably can keep equipment in use longer and *cut maintenance and replacement costs* by using Republic Cold Drawn Alloy Steel Bars.

Republic Alloy Steels are exceptionally high in strength and toughness. They respond uniformly to hardening treatment. In cold drawn bar form, they provide the close tolerance, accuracy of section, fine surface finish and UNIFORM MACHINABILITY characteristic of Union Cold Drawn Products. Thus, they further add to economy by helping to cut parts production costs.

Republic Cold Drawn Alloy Steel Bars are available in all popular analyses, in standard shapes and sizes, furnace treated as you require—annealed, normalized, heat treated, spheroidized, stress relieved or carbon corrected.

Republic metallurgists are ready *now* to help you get the results you need. Write for further information.

REPUBLIC STEEL CORPORATION
Alloy Steel Division • Massillon, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, New York

REPUBLIC STEEL

ALLOY STEEL BARS

Other Republic Products include Carbon and Stainless Steels—Sheets, Strip, Plates, Pipe, Bars, Wire, Pig Iron, Bolts and Nuts, Tubing

Announcing "NORMA" Stability-Tested GREASE

For General Purpose Bearing Lubrication

- ***CUTS BEARING LUBRICATION COSTS***
- ***INCREASES BEARING LIFE***
- ***ASSURES EFFICIENT BEARING OPERATION***

Users of ball and roller bearings can now obtain "Norma" Stability-Tested grease for all types of general purpose bearing lubrication.

Used for years in Norma-Hoffmann prepacked sealed bearings, "Norma" Stability-Tested grease has been giving excellent performance in all types of applications.

Outstanding advantages include —

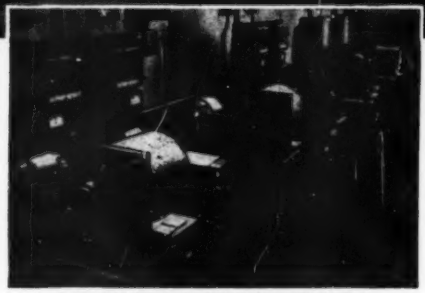
High Resistance to Oxidation in storage and in service as proven by the well known Norma-Hoffmann Oxidation Bomb Test.

Insoluble in Water — will not emulsify or aerate in the presence of condensed moisture.

Protects Against Corrosion — Actual field tests in the Canal Zone prove its outstanding corrosion resistance.

Laboratory Tested—Each batch of grease is laboratory controlled to meet rigid specifications.

"Norma" Stability-Tested grease is available in tubes for easy bearing lubrication and in bulk for large quantity grease users. Keep your bearings operating at peak efficiency, use "Norma" Stability-Tested grease. Write for prices and information.



RUNNING TESTS FOR GREASE PERFORMANCE

The test units, illustrated, determine the lubricating properties of "Norma" Stability-Tested greases at elevated temperatures and under actual running conditions. Greases are tested in bearings operated at constant speed and temperature with regular cooling and starting cycles. Bearings are thrust loaded by springs. In other test units, bearings are loaded radially.

NORMA-HOFFMANN *Precision* **BEARINGS**

BALL • ROLLER • THRUST

NORMA-HOFFMANN BEARINGS CORPORATION

Stamford, Connecticut

Field Offices: New York • Chicago • Cleveland • Detroit • Cincinnati • Los Angeles • San Francisco • Dallas • Seattle • Phoenix

He's a particularly vicious thief. He preys on machines in plants of all kinds all over the country—slowing production, slashing profits, collecting an enormous toll from industry.

You think he's not at work in *your* plant? It will pay you to be suspicious enough to find out *for sure*—for his ways are devious.

For example . . . here are some places to look.

Are the grease guns in your plant still being filled by old-time "paddle" methods—wasting time, wasting grease, risking contamination and dirt? You've caught a suspect!

You can save 3¾ man hours for every 100 lbs of grease and eliminate contamination risks.

Are you lubricating machines by "hand and muscle"—the old, time-wasting, hit-or-miss method? Here's evidence of thievery!

You can save as much as 23.9 man hours in applying each 100 lbs. of grease!

What about the cost of "down-time"—when a bearing burns, a gear fails, precision is "off" because of faulty or inadequate lubrication? Thievery again!

You can eliminate human error—make sure that each lubrication point gets the correct grease, in an accurately measured amount and at the proper time.

Have you any suspicions that there is a profit thief loose in your plant? Is he hiding behind the mask of faulty, old-time, costly lubrication methods—robbing you just as surely as though he "tapped the till"?

There's one proven way to stop this loss.

An Alemite representative can tell you in 10 minutes how Alemite Methods will simplify and better organize your lubrication procedures. He can show you how mechanized lubrication from barrel-to-bearing will increase your production and profits.

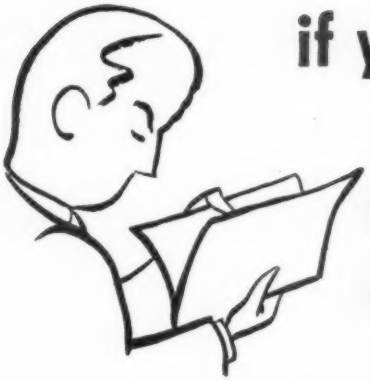
Telephone your Alemite Distributor. Or write to Alemite, 1899 Diversey Parkway, Chicago 14, Illinois.

ALEMITE

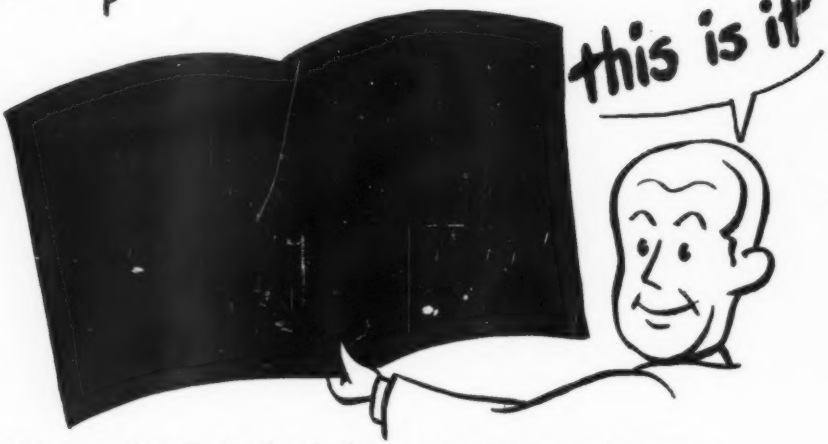
REG. U.S. PAT. OFF.

MODERN LUBRICATION METHODS THAT CUT PRODUCTION COSTS

Another Product of STEWART WARNER



if you're looking for the best in reverse-current cleaning of steel before plating



Maybe Oakite Composition No. 90 is just the electrocleaner you need. It effectively removes oils, greases, smuts—all the objectionable films that interfere with *good plating*.

How does Oakite Composition No. 90 work? High conductivity keeps oxygen bubbling off work, prying dirt loose at a rapid rate. Wetting and dispersing action speeds up cleaning. Water softening ability prevents formation of sticky soap films. Buffering action lengthens solution life. Bubbles are just strong enough to *prevent* thick, explosive foam.

In short, Oakite Composition No. 90 meets all your needs for better reverse-current cleaning. Proof? Send coupon for electrocleaning demonstration or literature. No obligation.

For **FREE** *Data Send Coupon To:*

OAKITE PRODUCTS, INC.
24 Thames St., N. Y. 6, N. Y.

At no cost to me, send information about:

- ☐ electrocleaning
- ☐ brass-cleaning
- ☐ steam-detergent cleaning
- ☐ alkaline cleaning
- ☐ machining coolants
- ☐ pre-paint treatment
- ☐ burnishing
- ☐ spray-booth water treatment
- ☐ paint-stripping
- ☐ barrel-cleaning
- ☐ rust control

OAKITE

Trade Mark Reg. U. S. Pat. Off.

OAKITE 40 ANNIVERSARY YEAR

INDUSTRIAL CLEANING MATERIALS • METHODS • SERVICE

Technical Service Representatives in Principal Cities of U. S. & Canada

There's A Reason

When a Tool of This Size Pays for Itself in Less Than a Year

Planing a Spring Hanger Die out of HARDITEM B steel. Tolerance .003", good commercial finish. Transue & Williams Steel Forging Corporation.

Machining copper Ultra-Speed Resistance Welder Unit for The Federal Machine and Welder Company to a mirror finish. Tolerance 0.000".

High speed planing of two grey iron spacer blocks for The Hoover Company. Tolerance .0025.

ROCKFORD *Hy-Draulic* SHAPER-PLANER

Rockford *Hy-Draulic* machine tools, such as the Shaper-Planer illustrated above, have in many cases paid for themselves in less than a year in places where they have replaced obsolete or worn equipment . . . and have invariably increased production and lowered costs when replacing mechanically actuated tools.

The reason? Superior construction of Rockford machines and unmatched efficiency of *Hy-Draulic* powered table drives and tool feeds . . . plus easy work set-up, easy machine adjustment, uniform speed for the full cutting stroke, rapid reversal and quick return. The result is precision work at high production speed.

Rockford Hy-Draulic Shaper-Planers are built in five standard sizes, with table stroke lengths from 42" to 144". Second cross rail head . . . and side head available as extra equipment.

You are invited to compare Rockford performance with that of your present equipment. We will be happy to make a machine time estimate on any part. Send your blueprints to our engineering department.

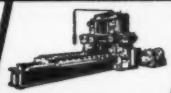
ROCKFORD MACHINE TOOL CO.
ROCKFORD ***ILLINOIS***

4808

Hy-Draulic

SHAPERS

PLANERS



SLOTTERS

SHAPER-PLANERS

Announcing "NORMA" Stability-Tested GREASE

For General Purpose Bearing Lubrication

- **CUTS BEARING LUBRICATION COSTS**
- **INCREASES BEARING LIFE**
- **ASSURES EFFICIENT BEARING OPERATION**

Users of ball and roller bearings can now obtain "Norma" Stability-Tested grease for all types of general purpose bearing lubrication.

Used for years in Norma-Hoffmann prepacked sealed bearings, "Norma" Stability-Tested grease has been giving excellent performance in all types of applications.

Outstanding advantages include —

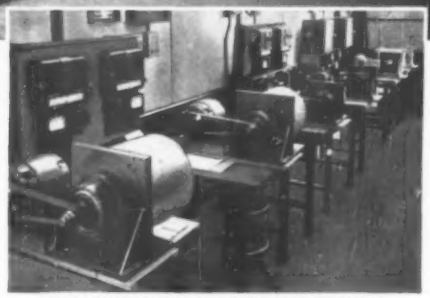
High Resistance to Oxidation in storage and in service as proven by the well known Norma-Hoffmann Oxidation Bomb Test.

Insoluble in Water — will not emulsify or aerate in the presence of condensed moisture.

Protects Against Corrosion — Actual field tests in the Canal Zone prove its outstanding corrosion resistance.

Laboratory Tested—Each batch of grease is laboratory controlled to meet rigid specifications.

"Norma" Stability-Tested grease is available in tubes for easy bearing lubrication and in bulk for large quantity grease users. Keep your bearings operating at peak efficiency, use "Norma" Stability-Tested grease. Write for prices and information.



RUNNING TESTS FOR GREASE PERFORMANCE

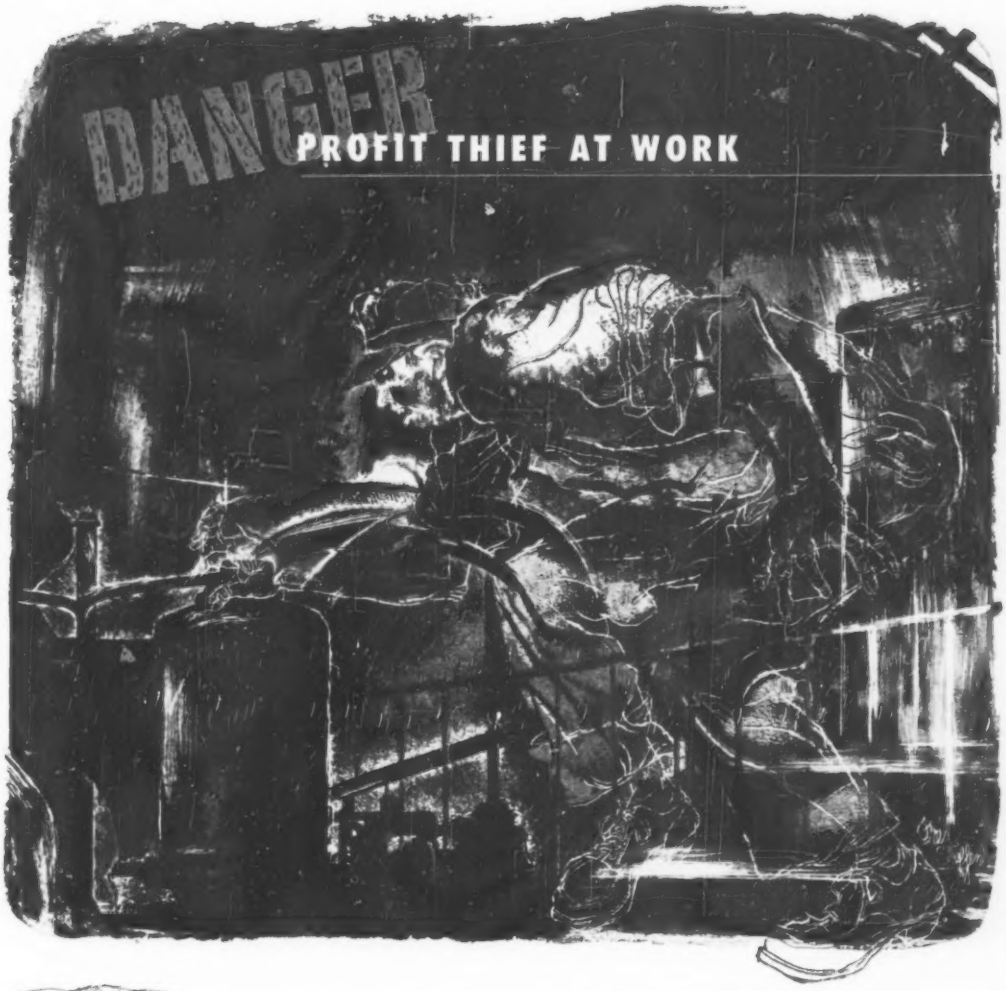
The test units, illustrated, determine the lubricating properties of "Norma" Stability-Tested greases at elevated temperatures and under actual running conditions. Greases are tested in bearings operated at constant speed and temperature with regular cooling and starting cycles. Bearings are thrust loaded by springs. In other test units, bearings are loaded radially.

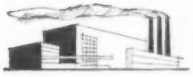
NORMA-HOFFMANN *Precision* **BEARINGS**

BALL • ROLLER • THRUST

NORMA-HOFFMANN BEARINGS CORPORATION
Stamford, Connecticut

Field Offices: New York • Chicago • Cleveland • Detroit • Cincinnati • Los Angeles • San Francisco • Dallas • Seattle • Phoenix





He's a particularly vicious thief. He preys on machines in plants of all kinds all over the country—slowing production, slashing profits, collecting an enormous toll from industry.

You think he's not at work in *your* plant? It will pay you to be suspicious enough to find out *for sure*—for his ways are devious.

For example . . . here are some places to look.

Are the grease guns in your plant still being filled by old-time "paddle" methods—wasting time, wasting grease, risking contamination and dirt? You've caught a suspect!

You can save $3\frac{3}{4}$ man hours for every 100 lbs of grease and eliminate contamination risks.

Are you lubricating machines by "hand and muscle"—the old, time-wasting, hit-or-miss method? Here's evidence of thievery!

You can save as much as 23.9 man hours in applying each 100 lbs. of grease!

What about the cost of "down-time"—when a bearing burns, a gear fails, precision is "off" because of faulty or inadequate lubrication? Thievery again!

You can eliminate human error—make sure that each lubrication point gets the correct grease, in an accurately measured amount and at the proper time.

Have you any suspicions that there is a profit thief loose in your plant? Is he hiding behind the mask of faulty, old-time, costly lubrication methods—robbing you just as surely as though he "tapped the till"?

There's one proven way to stop this loss.

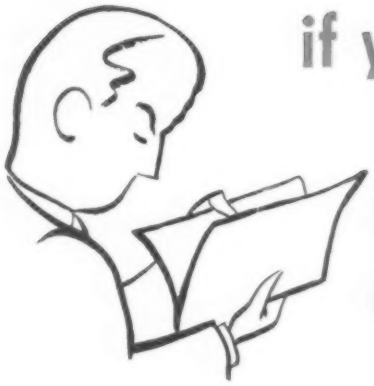
An Alemite representative can tell you in 10 minutes how Alemite Methods will simplify and better organize your lubrication procedures. He can show you how mechanized lubrication from barrel-to-bearing will increase your production and profits.

Telephone your Alemite Distributor. Or write to Alemite, 1899 Diversey Parkway, Chicago 14, Illinois.

ALEMITE

STEWART WARNER

MODERN LUBRICATION METHODS THAT CUT PRODUCTION COSTS



if you're looking for the best in reverse-current cleaning of steel before plating

Maybe Oakite Composition No. 90 is just the electrocleaner you need. It effectively removes oils, greases, smuts—all the objectionable films that interfere with *good plating*.

How does Oakite Composition No. 90 work? High conductivity keeps oxygen bubbling off work, prying dirt loose at a rapid rate. Wetting and dispersing action speeds up cleaning. Water softening ability prevents formation of sticky soap films. Buffering action lengthens solution life. Bubbles are just strong enough to *prevent* thick, explosive foam.

In short, Oakite Composition No. 90 meets all your needs for better reverse-current cleaning. Proof? Send coupon for electrocleaning demonstration or literature. No obligation.

For **FREE** *Data Send Coupon To:*

OAKITE PRODUCTS, INC.
24 Thames St., N. Y. 6, N. Y.

At no cost to me, send information about:

- ☐ electrocleaning
- ☐ brass-cleaning
- ☐ steam-detergent cleaning
- ☐ alkaline cleaning
- ☐ machining coolants
- ☐ pre-paint treatment
- ☐ burnishing
- ☐ spray-booth water treatment
- ☐ paint-stripping
- ☐ barrel-cleaning
- ☐ rust control

OAKITE

Trade Mark Reg. U. S. Pat. Off.

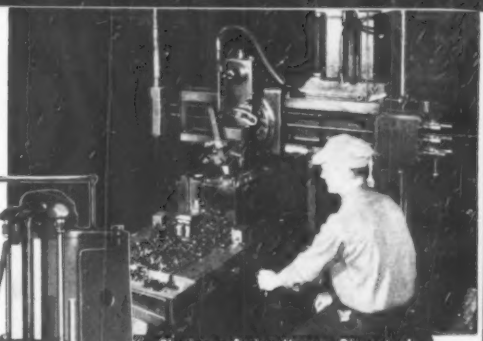
OAKITE 40th ANNIVERSARY YEAR

INDUSTRIAL CLEANING MATERIALS • METHODS • SERVICE

Technical Service Representatives in Principal Cities of U. S. & Canada

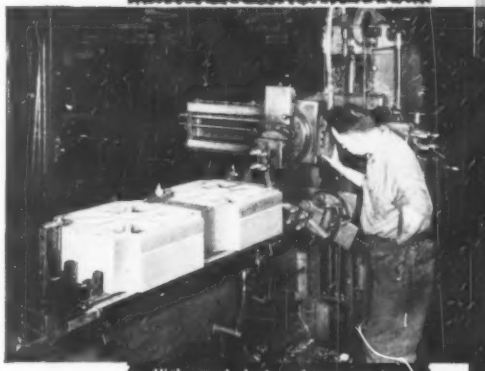
There's A Reason

When a Tool of This Size Pays for Itself in Less Than a Year



Planing a Spring Hanger Die out of HARDTEM B steel. Tolerance ±.003", good commercial finish. Transue & Williams Steel Forging Corporation.

Machining copper Ultra-Speed Resistance Welder Unit for The Federal Machine and Welder Company to a mirror finish. Tolerance ±0.000".



High speed planing of two grey iron spacer blocks for The Hoover Company. Tolerance ±.0025".

ROCKFORD *Hy-Draulic*
SHAPER-PLANER

Rockford *Hy-Draulic* machine tools, such as the Shaper-Planer illustrated above, have in many cases paid for themselves in less than a year in places where they have replaced obsolete or worn equipment . . . and have invariably increased production and lowered costs when replacing mechanically actuated tools.

The reason? Superior construction of Rockford machines and unmatched efficiency of *Hy-Draulic* powered table drives and tool feeds . . . plus easy work set-up, easy machine adjustment, uniform speed for the full cutting stroke, rapid reversal and quick return. The result is precision work at high production speed.

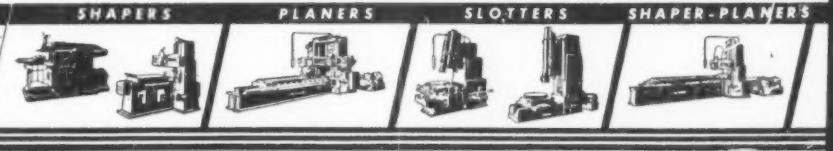
Rockford Hy-Draulic Shaper-Planers are built in five standard sizes, with table stroke lengths from 42" to 144". Second cross rail head . . . and side head available as extra equipment.

You are invited to compare Rockford performance with that of your present equipment. We will be happy to make a machine time estimate on any part. Send your blueprints to our engineering department.

ROCKFORD MACHINE TOOL CO.
ROCKFORD ***ILLINOIS***

4808

Hy-Draulic
REG. U. S. PAT. OFF.



the A-B-C's of SCULLY-JONES ARBORS

Absolute Accuracy, as well as stamina, are assured in long production runs, because of the careful heat treating and grinding of Scully-Jones Arbors, at every step from rough forgings to finished tool.

Better Service to you, because large stocks of Scully-Jones Arbors are maintained from which your requirements can be filled immediately.

Continual Cost Reduction is accomplished by Scully-Jones Individual Arbor Set-Ups.

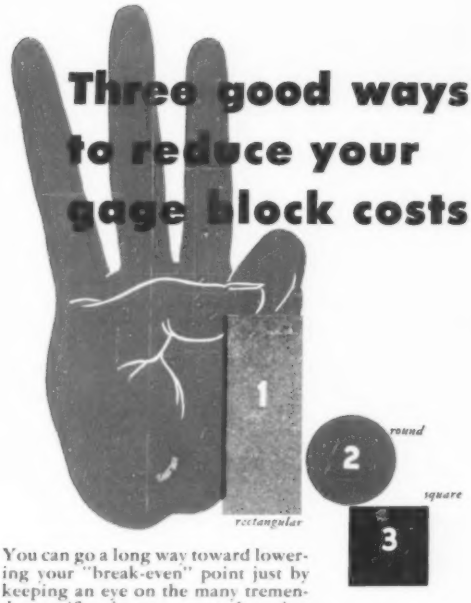
Standard Arbors for all machines having N. M. T. B. Tapers.
See Pages 112 and 114, Scully-Jones Catalog No. 500, for Style A and B Arbors. Send drawings or specifications for prompt quotations on special arbors.

Refer to the Scully-Jones Catalog showing over 500 types and sizes of cutting tools, collet chucks, boring equipment, centers, etc.

Scully-Jones AND COMPANY

1902 SOUTH ROCKWELL STREET • CHICAGO 8, U.S.A.

Three good ways to reduce your gage block costs



You can go a long way toward lowering your "break-even" point just by keeping an eye on the many tremendous trifles in your manufacturing costs. Take gage blocks, for example. The price you pay for even the best is insignificant compared to the savings they make possible. Assured sustained accuracy of production! More efficient inspection. Fewer rejects. Yet here are three good ways to cut this basic cost of precision.

1 **Get longer wearing millionths with**
ELLSTROM CHROMIUM PLATED GAGE BLOCKS

They give you 5 to 20 times longer wear than ordinary blocks, yet they cost but very little more. Unconditionally guaranteed to specified millionths. Rated "tops" for all-around gage block quality.

2 **Maintain the accuracy of your basic standards through**
ELLSTROM INSPECTION SERVICE

Rejects can raise cain with costs. So it's false economy to let your gage blocks become worn beyond their specified millionths. Let Ellstrom inspect your gage blocks periodically . . . and replace them as required . . . to assure constant "block-by-block" accuracy.

3 **Save up to 20% on new blocks through the liberal**
ELLSTROM EXCHANGE PLAN

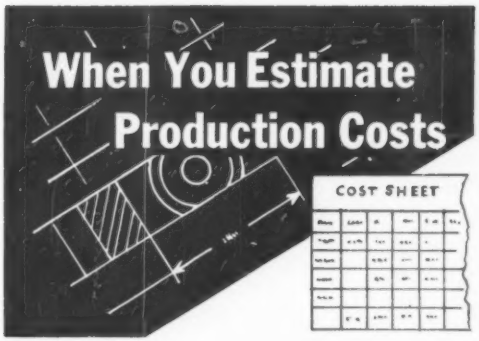
When you need new blocks, don't scrap your old ones. Trade 'em in! They're worth up to 20% on the "W" purchase price of new ones under Ellstrom's Exchange Plan.

New ELLSTROM Catalog of Standards!
Contains complete specifications and prices on standard Ellstrom Gage Block Sets . . . plus full details on Ellstrom's Inspection Service and Exchange Plan. Write for your copy today!

Ellstrom... *measuring in millionths for 3 generations*

DEARBORN GAGE CO. 22035 Beech Street Dearborn, Michigan

Originators of Chromium Plated Gage Blocks



How Much Do You Allow for VIBRATION?

Where plants have vibration problems of any kind, production costs are higher than they need to be.

Don't ask your accountant for verification of this fact—ask your production men who have to get the work out on time so that it passes inspection.

Vibration Control can help shave costs of Labor, Materials and Overhead, and although the individual savings may seem too *small* to bother with, they can add up to a total too *important* to be overlooked—with competition the way it is today. For instance,

LABOR—Vibration causes employee fatigue. Control vibration and you increase output per man hour.
Vibration causes excessive machine wear. Control vibration and your operators spend more time producing—less time watching the machine being repaired or adjusted.
Vibration often limits machine speeds. Control vibration and you step up the speed.
Vibration from punch presses, hammers and other disturbers has often led to the practice of segregating them. Control vibration, and you get a better plant layout, with machines where they belong for straight line work flow—and you save on materials handling costs.

MATERIALS—Vibration transmitted from other machines can seriously impair the quality of work in process on rigidly mounted grinders and other precision machine tools. Control vibration by isolating the vibrating machine or the precision tool, and you reduce rejects and work spoilage.

OVERHEAD — Vibration requires extra maintenance of plant and equipment, and decreases useful machine life. Vibration control will keep these costs down.
Vibration often increases costs for foundations and floor construction. Vibration control, properly engineered, can often reduce or entirely eliminate foundation requirements—or permit lighter floor construction. It frequently makes it possible to install impact machinery on upper floors.
Vibration often causes neighbor trouble and complaints from adjacent departments or tenants. Vibration control can iron out the objections.

Korfund Vibration Control is neither complicated nor expensive. In a half century of service to industry, we have developed a wide range of materials and methods which will give the required degree of isolation at minimum cost. During this time we have successfully isolated all types of equipment from office machines to hammers weighing more than a million pounds, from small motor-generator sets and laboratory equipment to 1500 hp diesels.

If you would like to have us apply this experience to help you decide whether vibration control is worthwhile for you, give us the type, make and model number of the equipment which is causing you trouble, and we will give you facts and figures—without obligation.

Get your copy of the new illustrated bulletin which describes the advantages and limitations of spring mountings, rubber mountings, cork materials, together with a helpful selector chart and useful data on installation and specification. Ask for G-101.

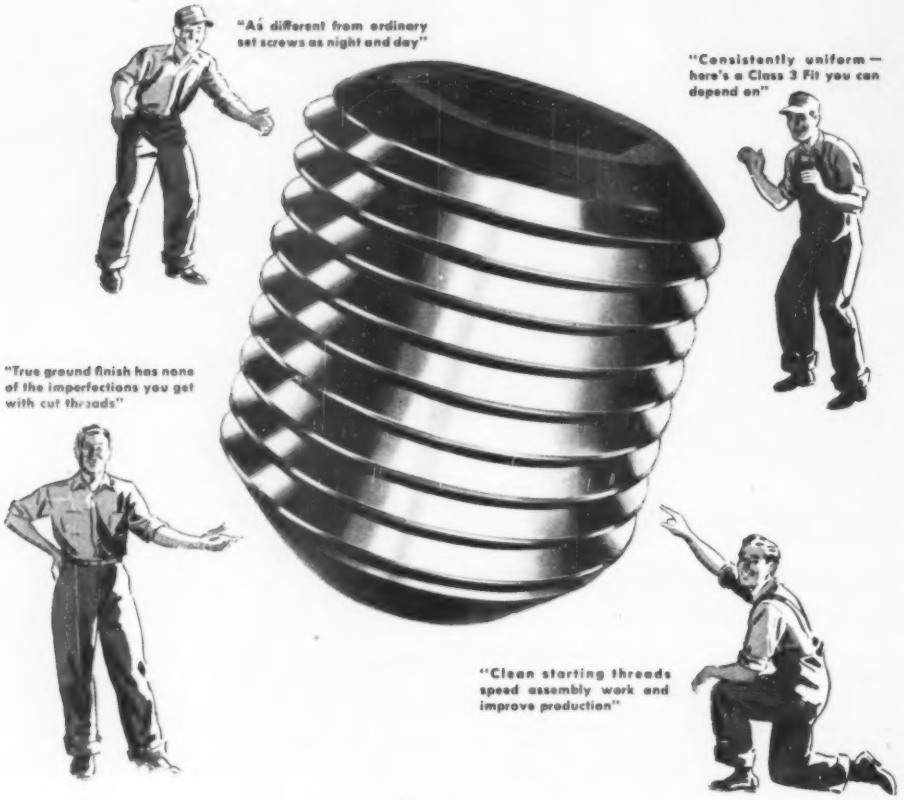
Exclusive National Distributor for Armstrong's Vibracork

KORFUND VIBRATION CONTROL — SPRINGS — RUBBER — CORK

Representatives in Principal Cities

THE KORFUND COMPANY, INC.
48-39-B Thirty Second Place • Long Island City 1, N. Y.

Parker-Kalon GROUND THREAD Socket Set Screws are The TALK of the SHOP!


"As different from ordinary set screws as night and day"
"Consistently uniform — here's a Class 3 Fit you can depend on"
"True ground finish has none of the imperfections you get with cut threads"
"Clean starting threads speed assembly work and improve production"

Compare! Write for Samples!

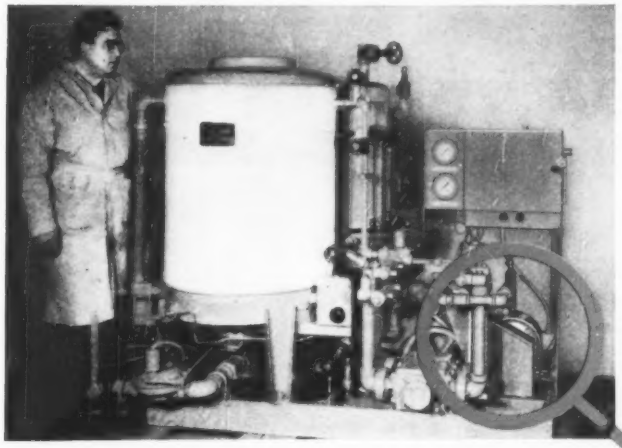
See why P-K Ground Thread Socket Set Screws speed assemblies, improve strength and safety. Thread grinding, once reserved for screws used in the finest precision equipment, now gives Parker-Kalon Socket Set Screws the accurate finish and faultless contour that mean faster assembly and more sales for your products. Write for samples today.

AVAILABLE FOR PROMPT DELIVERY

PARKER-KALON® CORPORATION
200 Varick Street
New York 14, N. Y.

SOLD ONLY THROUGH ACCREDITED DISTRIBUTORS

A. O. Smith Builds ELECTRIC MOTORS



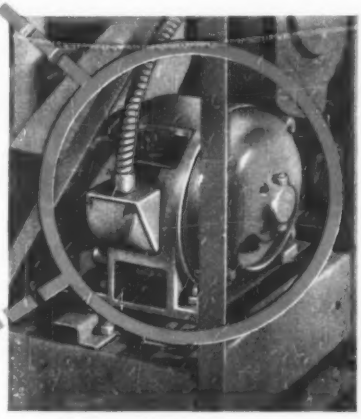
SMITHway Electric Motors Now Power Hundreds of Products Including CLAYTON RE-CIRCULATING STEAM GENERATORS

The A. O. Smith research and engineering staff is at your service, to help integrate electric motor design with your product design, and to achieve the most efficient and economical product operation.

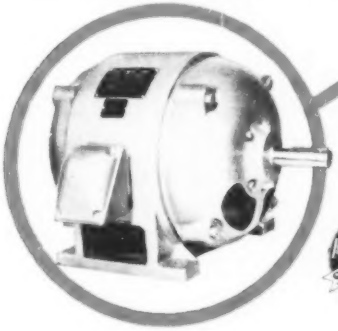
In addition to a standard line of general-purpose motors, the SMITHway line includes a broad variety of special motors to meet the exact power requirements of many modern-day machines and product applications.

If you are seeking improved product performance, or require special characteristics in your power component, consult A. O. Smith.

Write for Bulletin No. EM-152



CLAYTON STEAM GENERATORS deliver "packaged steam" to meet every need in dairies, canneries, laundries, kitchens, and for cleaning, sterilizing, dehydration, steam-processing. They are complete package (water tube) boilers ready to connect and operate. Fully automatic, they deliver quality steam in 5 minutes from a cold start, at full working pressure.



SMITHway ELECTRIC MOTOR, powering Clayton Model W O 30 hp shown here, is a 1½-hp, single or 3-phase, 4-pole standard horizontal motor. Other Clayton models use ½, ¾, 2, 3, and 5 hp SMITHway Motors.

Ask the A. O. Smith man about electric motors for both special and standard uses

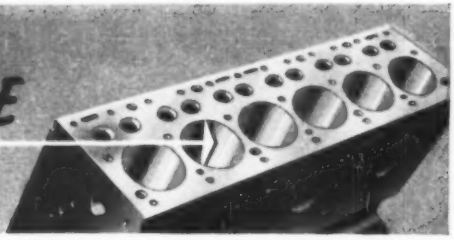
24-HOUR NATIONWIDE SERVICE

The A. O. Smith Product Service Division provides fast, low-cost electric-motor service to more than 200 authorized service stations, on a 24-hour, off-the-shelf basis. Factory Service Branches and Warehouses at Union, N. J., Chicago, Los Angeles.

A. O. SMITH Corporation

New York • Boston • Cleveland • Syracuse • Cincinnati
Atlanta • Chicago • Detroit • Minneapolis • Milwaukee • Houston
Tulsa • Dallas • Denver • Seattle • Los Angeles • San Francisco
Motor Export Department: 13 East 40th St., New York 16
Cables: ARLAB NEW YORK

Parco Lubrite HERE



means safer break-in at higher speeds

On all bearing surfaces PARCO LUBRITE

Holds Oil • Smooths Break-In
Retards Subsequent Wear

Here's an interesting application of Parco Lubrite in the automobile industry. Parco Lubrite on the cylinder walls makes break-in at higher speeds practical. The non-metallic crystalline structure of the coating prevents metal to metal contact between operating parts, reduces galling and scratching, maintains a film of oil for positive lubrication.

Since the break-in and seating of these protected parts is so smooth and easy, a more exact fit of the parts is quickly attained, and engine performance is improved.

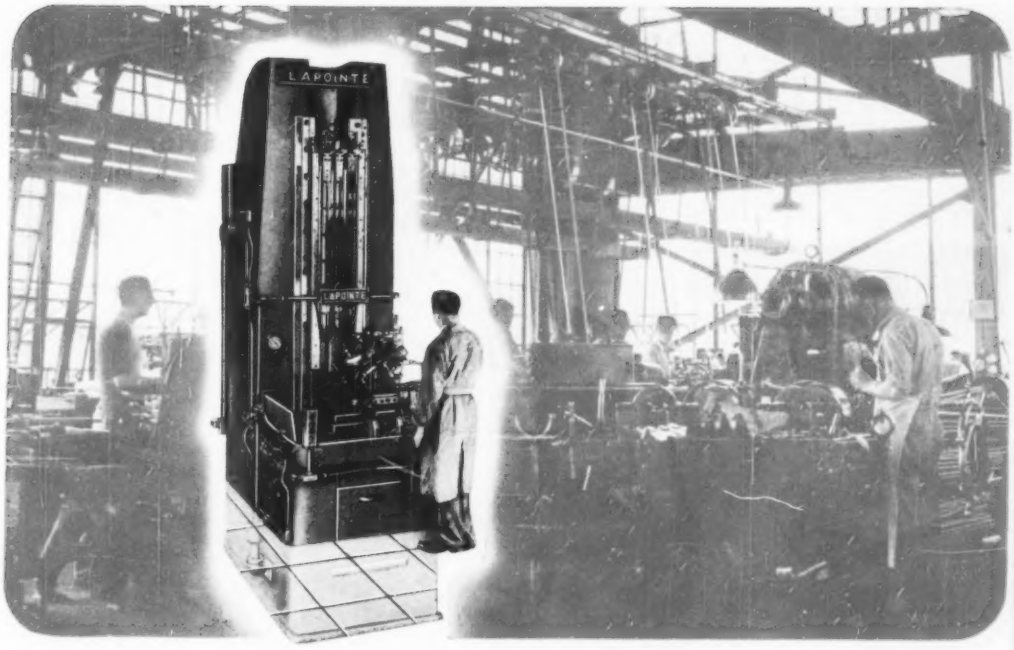
This is just an example of the many applications for Parco Lubrite. Its benefits may be exactly the answer to produce smoother break-in and better long-time performance on bearing surfaces in *your* product. Write today for full information.

Bonderite, Parco, Parco Lubrite—Reg. U.S. Pat. Off.

PARKER

PARKER RUST PROOF COMPANY
2196 East Milwaukee Ave.
Detroit 11, Michigan

BONDERITE Holds Paint to Metal . . . PARCO PRODUCTS Inhibit Rust . . . PARCO LUBRITE Retards Wear on Friction Surfaces



LAPOINTE ...the world's OLDEST and LARGEST

manufacturers of

BROACHES and BROACHING MACHINES

• Being the world's *first* manufacturer of broaching machines and broaches, Lapointe has more years of practical experience, more engineering know-how, more downright technical knowldege to put at your disposal, *than you can obtain anywhere else!*

• Being the world's *largest* manufacturer of broaching machines and broaches, Lapointe has production facilities second to none, to meet your needs. In our shops and among our engineers there is an accumulated back-log of experimental and development work that is an invaluable asset to every Lapointe customer. It has cost us money and time to gain this experience . . . it is yours for the asking.

When you need BROACHING TOOLS, remember: "Lapointe's the way to better broaching!"

We design and produce broaches for all makes of broaching machines. Our tools are cut from steel made to our own formula, treated by our exclusive ELECTROLIZING process for *much longer life*, and will give trouble-free satisfaction on your broaching machines.

Why not ask us for an estimate on that job you're considering right now? Send for literature: LAPOINTE, 2 Tower St., Hudson, Mass.

THE *Lapointe* MACHINE TOOL COMPANY

HUDSON, MASSACHUSETTS • U. S. A.

Branch Factory • Edgware • Middlesex • England

HUDSON LAPOINTE MASS.

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHES AND BROACHING MACHINES

"50 Times Better"

Talide
(TUNGSTEN CARBIDE)
Drawing Dies

TALIDE METAL MEETS EVERY REQUIREMENT

PIERCING AND LAMINATION DIES

SWAGING DIES
(For Forming Solid and Tubular Shapes)

POWDER METALLURGY DIES *(For Compacting Powdered Metals and Materials)*

Talide Dies outwear steel dies 50 to 1. Production runs of over 1,000,000 pieces are commonly obtained. Long life of super-hard Talide Dies reduces down time, increases output, lowers unit cost and makes a better product.

Tungsten Carbide Dies take and hold a brilliant polish, thereby imparting a better finish to your product.

Talide Metal Dies range in size from pin point to 24" I. D., and in many complex shapes . . . used for blanking, drawing, swaging, extruding, spinning or curling.

Send us prints or parts for estimate and recommendations and ask for Catalog 48-WP.

BLANKING AND FORMING DIES
(For Stamping Lamination Discs, Metals, Plastics, Paper)

TUBE MANDRELS

HEADING AND EXTRUSION DIES
(For Shaping and Sizing Bolts, Nuts, Screws and Collapsible Tubes)

DRAWING DIES
(For Wire, Tubing and Bar Stock)

SPINNING AND CURLING ROLLERS

SINTERED CARBIDES
METAL CARBIDES CORPORATION
TALIDE
YOUNGSTOWN, OHIO
HOT PRESSED CARBIDES

METAL CARBIDES CORPORATION

YOUNGSTOWN 5, OHIO *Pioneers in Tungsten Carbide Metallurgy*

CUTTING TOOLS . DRAWING DIES . WEAR RESISTANT PARTS

WHEN you're figuring ways to reduce production costs — here's something to think about:

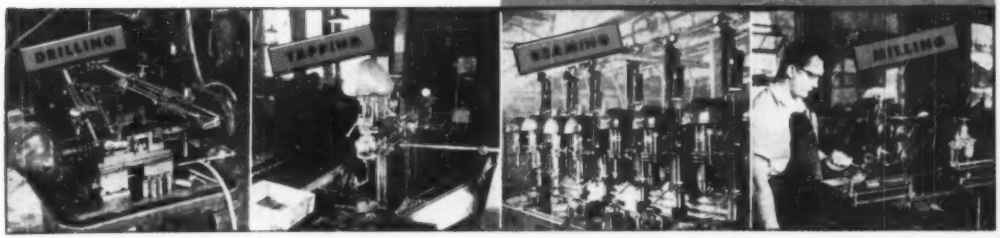
In such operations as drilling, tapping, reaming, milling, etc., you can cut costs 15% to 60% by replacing manual feeding with Bellows "Controlled-Air-Power" feeding.

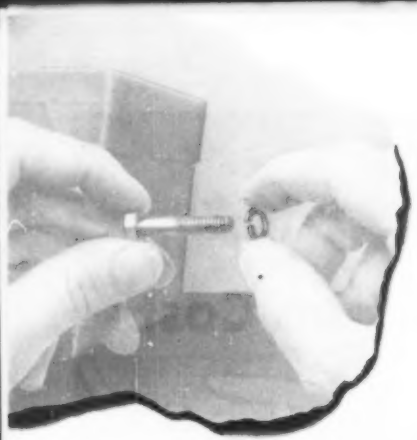
These inexpensive power feeding devices are easily installed on almost any standard machine tool. Precision controls provide correct feeding rates for any tool or material . . . cut down rejects . . . assure more uniform production. With Bellows "Controlled-Air-Power" Feeds one operator is often easily able to run two or more machines with no more effort than he formerly spent on one — and with unit cost savings of 50% or more.

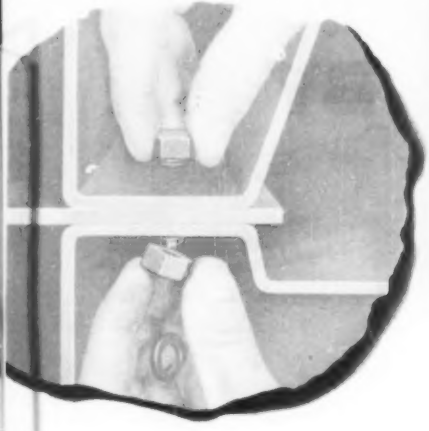
WRITE FOR THIS FREE BOOKLET

See how alert production men in all industries are cutting costs with "Controlled-Air-Power." No cost — no obligation but to read it carefully. It will help you save time and money. Address The Bellows Co., Dept. AM-649, Akron 9, Ohio.

The Bellows Co.
AKRON, OHIO

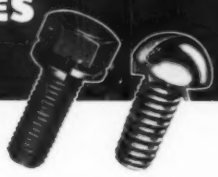






Eliminate Wasteful Practices

from your assembly line fastening picture with EATON SPRINGTITES and SEMS



Eaton Springtites are quality Reliance Spring Lock Washers of correct type and size pre-assembled on quality bolts and screws so they *can't come off*. The shank diameter fit of the Reliance Spring Washer on screws or bolts is so designed as to give the spring lock washer freedom of movement to rotate and act as a hardened thrust bearing, allowing greater torque in tightening the screws and bolts in the assembly.

Eaton Springtites eliminate assembling of lock washers on screws or bolts before they can be used—*save time and money*.

Eaton Springtites eliminate the chance of a bolt or screw being used in an assembly without a spring lock washer or with the wrong type or size spring washer—*protect your product and its performance*.

Eaton Springtites save time and space in the store room; simplify ordering, inventory, bookkeeping.

Eaton Springtites are available in screw and bolt sizes and various type heads to meet your fastening assembly requirements. Use Eaton Springtites and save.

RELIANCE SPRING LOCK WASHERS . . . An effective fastening device made to insure dependable, enduring bolt tightness. A type and size for every fastening need. Write for folder.

RELIANCE RINGS produce strong, easily-assembled shoulders on shafts or in counterbores without expensive machining or waste of metal. Many cross sections, all diameters; ends shaped to meet any requirement. Write for folder.

Reliance Division

OFFICES AND PLANT **MASSILLON, OHIO**

EATON

EATON MANUFACTURING COMPANY

Sales Offices: New York • Cleveland • Detroit • Chicago • St. Louis • San Francisco • Montreal

NEW PATENTED STEEL BAR SAVES YOU MONEY 4 WAYS

PROVIDES 4 IN 1 IN-THE-BAR-QUALITIES

Here is a cold-finished carbon steel bar, produced by a patented LaSalle process, that possesses in-the-bar a unique combination of *all four* desired qualities . . . Strength . . . Machinability . . . Wearability . . . Minimum Warpage. STRESSPROOF is a high strength steel (twice as strong as ordinary cold-finished shafting) and is used without heat treating. It machines well, too—fully 50% better than heat-treated alloys of the same hardness. It possesses better wearability than many heat-treated carbon or alloy steels, and has been used successfully to replace case-carburized steels. Furthermore, because STRESSPROOF is stress relieved, warpage after machining is negligible, and straightening operations can be eliminated. Yet STRESSPROOF costs little more than ordinary cold-finished bars. It is also furnished ground and polished to close accuracies.

Stocked by Leading Steel Warehouses

SEND for FREE ENGINEERING BULLETIN

"New Economies in the Use of Steel Bars"

LaSalle Steel Co.
1416 150th Street
Hammond, Indiana

Please send me your STRESSPROOF Bulletin.

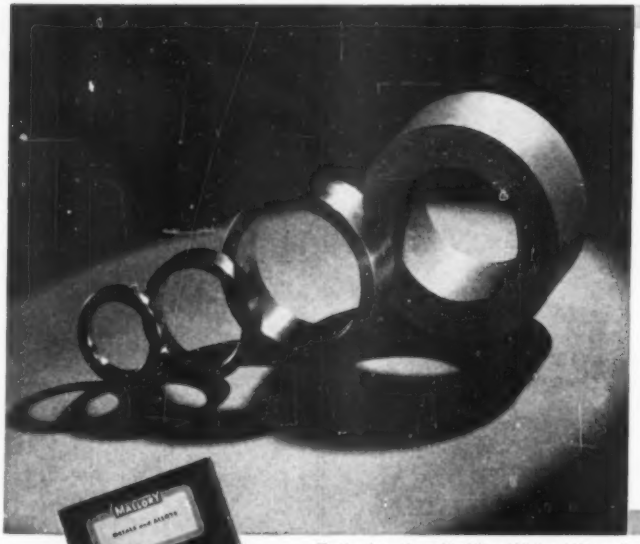
Name_____
Title_____
Company_____
Address_____
City_____ State_____

LaSalle STRESSPROOF

Reg. U. S. Pat. Off.

SEVERELY COLD-WORKED FURNACE-TREATED STEEL BARS

A Radium Shield or a Gyroscope Rotor... Mallory 1000 Metal Will Do It



Showing the ready machinability of Mallory 1000 metal.

MALLORY 1000 METAL HAS THESE SPECIAL CHARACTERISTICS:

- **A high density of 16.8 to 17.0 grams per cubic cm.**
- **A tensile strength of over 80,000 lbs. per square inch.**
- **High modulus of elasticity.**

A Technical Data sheet on Mallory 1000 metal is yours for the asking.

Do You Have a Copy?

The Mallory Metals and Alloys Booklet is free to engineers who request it on their company letterhead.

The following foundries are licensed to supply Mallory alloys:

City Pattern Foundry and Machine Co.
1161 Harper Ave. at Rivard St.
Detroit, Michigan

Cleveland Aluminum Casting Co.
901 Addison Road
Cleveland 3, Ohio

Commerce Pattern Foundry & Machine Co.
7450 Melville Ave.
Detroit 17, Michigan

Non-Ferrous Foundries, Inc.
2205 N. Sherman Drive
Indianapolis, Indiana

Philadelphia Bronze & Brass Corp.
22nd and Master Streets
Philadelphia, Pennsylvania

Railway & Industrial Engineering Co.
Greensburg, Pennsylvania

Mallory 1000 metal is a sintered tungsten-base alloy of high density. Wherever a part with extreme density and high strength is needed, Mallory 1000 metal will save you money.

Because of its extreme density it may be used as a shield or container for radium, in place of the more expensive metals.

Very high rotational speeds are possible without objectionable shift or drift in physical dimensions. For example, in a two-inch gyro ring speeds as high as 45,000 RPM are possible.

Mallory 1000 metal is a standard item, available in a wide variety of specially formed parts. Our engineering services are available to you for part design problems.

Many "Special" Metals are Standard at Mallory

Special Metallurgical Products

P. R. MALLORY & CO. Inc.

MALLORY

P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

SERVING INDUSTRY WITH

Capacitors — Rectifiers
Contacts — Switches
Controls — Vibrators
Power Supplies
Resistance Welding Materials

KLEIN CUTS COSTS with Correct CUTTING FLUIDS

MATHIAS KLEIN & SONS, Chicago, selected cutting fluids for machining high carbon vanadium steel forgings for the well known Klein pliers on a basis of competitive tests. When using D. A. Stuart's Solvol, tool life was more than double that secured by the best of several products tested.

With a 20 to 1 dilution of Solvol, side broaching is at the rate of 28,000 pieces per grind. Drilling, reaming and countersinking are done at the rate of 650 pieces per hour with a 30 to 1 dilution of Solvol.

The increase in tool life and production and the satisfactory finish secured with Solvol on this job are excellent examples of the cost cutting opportunities possible by using the best cutting fluid for the job. In buying cutting fluids it is *wise economy* to figure production costs rather than cutting fluid price. Write for booklet, *Cutting Fluids for Better Machining.*

STUART *service goes with every barrel*

D.A. Stuart Oil co.

2729 South Troy Street, Chicago 23, Ill.

GRIND TOOLS TO EXACT ANGLE .. FASTER

PROSSER CARBIDE GRINDERS

Model AA for dry grinding

Model EE for grinding wet or dry

YOU GET the grinding angle you want *instantly* with the famous indexing feature of these Prosser high-speed grinders. The quick-acting tables need never be raised or lowered—and once set, they stay put.

ECONOMICAL—You'll save time and you'll get more for your wheel dollar with a Prosser because wheels are easily adjusted to compensate for wear. Wheels can be used up practically 100%.

VERSATILE—Designed by the same Prosser engineers who introduced cemented carbide to American industry, today's Prosser Carbide Grinders are equally effective on stellite and high-speed steel.

Before you get a grinder for rough work or fine finishing, wet or dry . . . get the facts on the Prosser. For details on bench and floor models, on chip-breaker, drill-grinding and other attachments . . . write for literature.

DEALERSHIPS AVAILABLE

Established 1845

THOMAS PROSSER & SON 120 Wall Street, New York 5, N.Y.

By EUGENE L. GRANT

563 pages, 6x9, 50 tables, $5.00

SEE IT 10 DAYS FREE ➔

FOR BETTER, CHEAPER CONTROL OF PRODUCT QUALITY . . .

—use the statistical quality control techniques explained in this book. Shows how to use the Shewhart control chart to reduce spoilage and rework . . . to get better coordination in design, production and inspection.

McGRAW-HILL BOOK CO., INC.
330 W. 42nd St., New York 18

Send me Grant's Statistical Quality Control for 10 days' examination on approval. In 10 days I will remit $5.00, plus few cents for delivery or return book. (We pay for delivery if you remit with this coupon; same return privilege.)

Name .....
Address .....
City ..... Zone ..... State .....
Company .....
Position F-AM-49

Books sent on approval in U.S. and Canada only.

Remove up to 6 cu. ft. of Cast Iron Per Tool Grind

on Modern Planers

Kennametal Mechanically-Held Assembly Provides Outstanding Sturdiness; Permits Fullest Use of KENNAMETAL

Improved Shockproof KENNAMETAL K1 Withstands Heavy Cutting Pressures and Cratering Action of Modern Types of Cast Iron

Strong, Durable, Clamped-on Kennametal Planer Tools . . . Make Heavy-Duty Planing Practicable

Now you can take heavy roughing cuts at high speeds (100-250 ft min) on any of the newer type planers having a tool lifter. Clamped-on Kennametal Planer Tools make it practicable . . . and *profitable*. They remove metal at a faster rate—keep machine down time to a minimum—reduce tooling cost per piece—minimize grinding time and confusion.

Yes—you need a good, rigid, properly-powered, correctly-adjusted planer. And you *must* have a strong, shock-proof, thermal-strain-free carbide tool that can take a beating and like it. Here's where the uniformly sound structure of mechanically-held Kennametal K1 pays off. Read these typical performance reports:

"Kennametal Planer Tools remove 6.5 cubic feet of semi-steel per tool grind." "5 cubic feet of 180 Brinell cast iron removed per grind." "6 cubic feet of 180 Brinell cast iron removed per grind."

Our field engineers can help you apply this cost-cutting Kennametal tooling to your planing operations. Ask them to do it. And keep in mind—the cemented carbide that has the strength and durability to do tough roughing jobs on planers successfully is the carbide that can cut tooling costs on *all* your milling, boring machine, and lathe work. That's Kennametal.

KENNAMETAL *Inc.*, Latrobe, Pa.

MANUFACTURERS OF SUPERIOR CEMENTED CARBIDES AND CUTTING TOOLS THAT INCREASE PRODUCTION

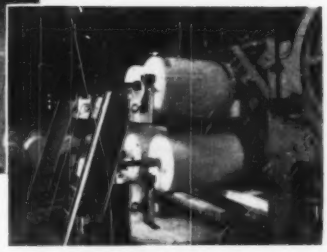
PLANER TOOL Style 9PH | PLANER TOOL Style 59PM | PLANER TOOL Style 15PM | PLANER TOOL Style 16PM

SAFER, QUICKER, EASIER MATERIAL HANDLING

Wayne Lift in Newspaper Plant

Tilting Loading Dock Ramps

Single Post Platform Hoist

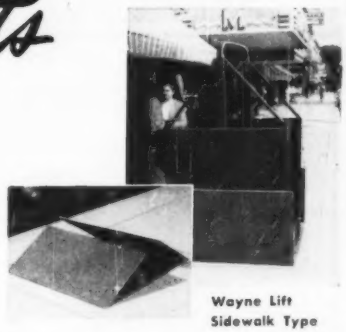


Easy to Handle Heavy Rolls

Cut Handling Costs

INCREASE PRODUCTION WITH WAYNE INDUSTRIAL HOISTS

"BETTER MATERIAL handling offers industry its biggest opportunity to cut production costs and to increase productivity," says Factory Management and Maintenance, which devoted forty-seven pages in January to this subject. Investigate what it can do for you. Let Wayne engineers help you design the proper equipment to assure better handling of material in your plant. There's a Wayne Hydraulic Hoist for every requirement. Write for more information.



Wayne Lift Sidewalk Type

Two Post Platform Hoist

MAIL *Now!*

WAYNE NATIONWIDE SERVICE

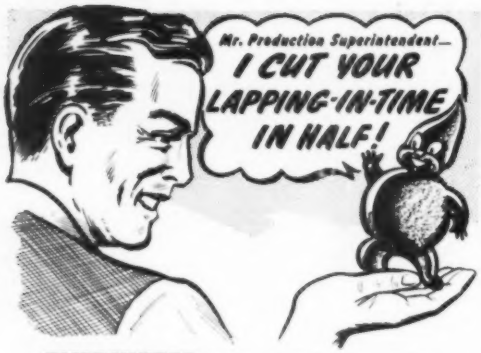
THE WAYNE PUMP COMPANY • FORT WAYNE 4, INDIANA
522 TECUMSEH STREET

Please send folder and other information on Wayne Industrial Hoists. I am interested in _____.

NAME _____ ADDRESS _____

CITY _____ STATE _____

AIR COMPRESSORS • HOSE REELS • POWER WASHERS • BULK PUMPS



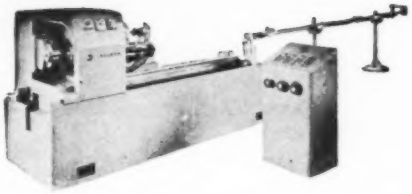
TIMECUTTER *is the NEW three-way improved lapping compound.*

This pre-mixed, ready-to-use compound cuts *TWICE AS FAST* as ordinary compounds...(by actual test)... It clings to the points of contact and really grinds...to a fine finish. Then, the silicon carbide washes off in a sludge, quickly and easily. The result... more speed on the production line.

TIMECUTTER

Write for full information about three-way improved TIMECUTTER
TIMESAVER PRODUCTS CO.
546 W. Washington Blvd., Chicago 6, Illinois

TRAVELLING TUBE CUTOFF
FOR USE WITH
WELDED TUBE ROLLING MILL



- Cuts tube to desired lengths directly from the mill and unloads.
- Travelling head is electrically oscillated and synchronized with the mill to insure cutting to accurate lengths.
- Can be readily installed on any mill.

Write for complete information.

THE ETNA MACHINE CO.
3409 Maplewood Ave. • Toledo 10, Ohio

New CARBIDE TOOL GRINDER
by WILLEY'S

Willey's 60
Equipped for Wet or Dry Grinding

Properly designed for free hand grinding of tungsten carbide tipped tools and other hard metal tools requiring keenest cutting edges and extreme accuracy. Handles rough, semi-finish and finish grinding. Sturdy construction. Uses 8" vitrified wheel for rough and semi-finish, and 6" diamond for finishing. Electrically driven coolant pump in pedestal. Full specifications on request

Write for Catalog 449
Please make request on your business letterhead.
Dealers: Write regarding territory.

WILLEY'S CARBIDE TOOL CO.
1342 W. Vernor Highway Detroit 1, Michigan

HARDNESS TESTER

The *Scleroscope* is the only hardness tester that takes in the entire range from the softest to the hardest metals without any adjustments.

MODEL D-1 DIAL TYPE
Write for Circular!

THE SHORE INSTRUMENT & MANUFACTURING CO., INC.
9025 VAN WYCK AVENUE
JAMAICA, NEW YORK
TELEPHONE: JAMAICA 6-6090

HOW TO USE INFRARED
for better results in heating and drying

THIS practical book shows you how to employ infrared radiation for better and more economical surface-finishing—for paint drying, metalworking, wood finishing, foundry molds, and for many industrial heating processes. It describes what equipment is available, how it operates, and where to use it.

INDUSTRIAL APPLICATIONS OF INFRARED

by James D. Hall, Advisory Engineer, Westinghouse Electric Corporation. 198 pages, 140 illus., $3.50

10 DAYS FREE TRIAL

McGRAW-HILL BOOK CO., Inc.
330 W. 42 St., NYC 18

Send me Hall's INDUSTRIAL APPLICATIONS OF INFRARED for 10 days' examination on approval. In 10 days I will remit $3.50, plus a few cents for delivery, or return the book.

Name .....
Address .....
City ..... Zone ..... State .....
Company .....
Position F-AM-49

Get Increased Cutting Efficiency

by grinding HAYNES STELLITE tools properly

Trade-Mark

To get best results with HAYNES STELLITE metal-cutting tools, they should be sharpened correctly, so that they have (1) smooth cutting edges, (2) correct clearance angles, and (3) no heat checks. These tools, which are designed for heavy cuts at high speeds and long life between grinds, can be readily reground as required, using standard grinding wheels and grinding methods. Here are a few practical suggestions that can be carried out with the grinding equipment in the average tool room.

For grinding wheel recommendations and other information, write to the nearest district office listed below and request a copy of the booklet, "HAYNES STELLITE Metal-Cutting Tools," Form 5401.

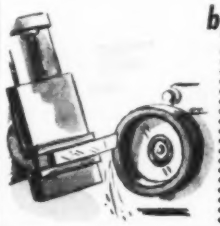
by Hand...

1. Grind the tool on a sharp, free-cutting wheel. Use firm and positive pressure. Keep the tool moving across the wheel face to avoid excessive localized heating and the possible checking of the cutting edge.

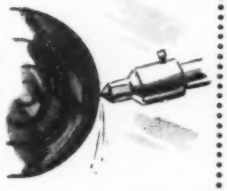
2. Do not dip the tool in water during grinding. Rapid chilling of the hot edge may cause surface checking.

3. Lap or hand stone the cutting edges after grinding to improve their efficiency.

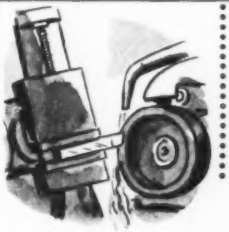
by Machine...



1. Use soft wheels, slow speeds, and rapid traverse. When grinding dry, take light cuts to avoid overheating and checking the work.



2. Dress the wheel as often as necessary to keep it free cutting, because a glazed wheel will check the cutting edge and shorten tool life.



3. Use heavier cuts and faster speeds when grinding wet. Direct a liberal flow of coolant at low velocity to the point of grinding.

HAYNES Alloys

TRADE-MARK

The trade-marks "Haynes" and "Haynes Stellite" distinguish products of Haynes Stellite Company.

Haynes Stellite Company

Unit of Union Carbide and Carbon Corporation

UCC

General Offices and Works, Kokomo, Indiana

Sales Offices

Chicago — Cleveland — Detroit — Houston

Los Angeles — New York — San Francisco — Tulsa

The

GOSS & De LEEUW

ONE TWO THREE

7 spindle tool rotating automatic chucking machine

Four Machine Spindles for boring, turning, facing and reaming operations on one to three ends provide greater and quicker production than any other "chucker" in the machine tool industry.

Three Threading Spindles perform from one to three right or left hand single or double threading operations, on one, two or three ends simultaneously, in perfect alignment, at productions from 100 to 500 pieces per hour.

Write for further interesting details.

Goss & DeLeeuw
MACHINE COMPANY
KENSINGTON, CONNECTICUT, U.S.A.

Use AIR *that's* LUBRICATED!

STOPS WEAR—Here's how to make cylinders, tools, and other air operated equipment work better and last longer. Use this new Hannifin "Air Warden" Unit! Adds atomized oil to air stream. Ends worry about lubrication of inaccessible parts.

GUARDS AGAINST RUST—Leaves film of oil covering all internal surfaces to protect against rust when equipment is shut down and idle.

SAVES TIME—Works automatically. Minimizes manual maintenance requirements. Oil supply always visible through transparent bowl. Positive shut off for filling without interrupting air flow.

ECONOMICAL—Provides effective lubrication without waste. Uses oil only when air flows. Feed rate accurately controlled, visible, and fully adjustable. ⅜" and ½" sizes. *Send for information about Hannifin "Air Warden" equipment.*

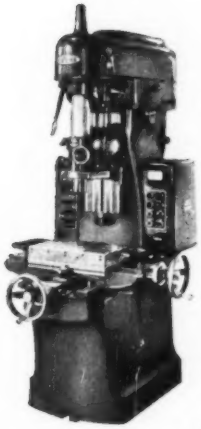
The "Air Warden" Line

HANNIFIN CORPORATION
1101 So. Kilbourn Ave. • Chicago 24, Illinois

"You can't do *today's* job with *yesterday's* tools and be in business *tomorrow*"

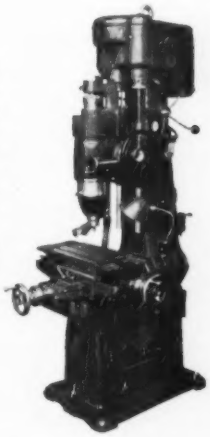
Ben Moreell

BEN MOREELL, *President*
JONES & LAUGHLIN STEEL CORPORATION

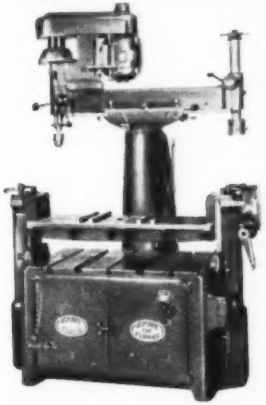


No. 2 MOORE JIG BORER, with its accurate lead screw settings within .0001", offers all the time-proven precision features associated with Moore Jig Borer construction for 15 years, plus numerous labor-saving advantages, including: increased capacity and size; infinitely variable spindle speeds; 3 power feed ratios; centralized controls.

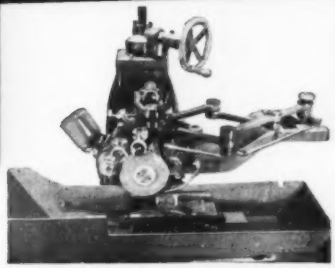
MOORE JIG GRINDER, an important contribution to tool and die-making, meets the growing need for finish-grinding holes to size and location, previously accomplished only by makeshift methods. It eliminates hours of checking on the bench or surface plate to correct holes in hardened parts.



Four ways to cut costs and meet competition by mechanizing your toolroom.



MOORE DIE FLIPPER takes the grunts, groans and wasted motions out of the toolroom. With it one diemaker does the work of three. He can take apart, turn over, drill, tap, try out, and inspect a complete die-set. It's a money saver from the start, for it can also be used as a radial drill.



MOORE PANTO-CRUSH WHEEL DRESSER speeds form-grinding and cuts costs. Both crush-forming and diamond-dressing are accomplished with this 2-in-1 unit permanently mounted on the wheel spindle of a surface grinder. You switch from one method to the other without disturbing workpiece setting

We'll be glad to send you complete descriptive literature on any of these machines.

MOORE SPECIAL TOOL COMPANY, INC.
738 UNION AVENUE, BRIDGEPORT 7, CONNECTICUT

ADD MOORE TOOLS TO YOUR TOOLROOM

JIG BORERS • JIG GRINDERS • PANTO-CRUSH WHEEL DRESSERS • DIE FLIPPERS • COMPLETE LINE OF HOLE LOCATION ACCESSORIES

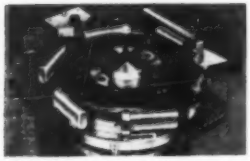
MARK *your* PRODUCTS

- FASTER
- BETTER
- at LOWER COST

with **NOBLEWEST**

PRODUCTION MARKING MACHINES

MODEL 246—Tooled for marking aluminum condenser parts. Production speed 60 to 70 pieces per minute.



MODEL 286—Tooled for marking capacitors. The complete inscription is permanently *rolled in*, lasts as long as product itself.

Don't let obsolete marking methods or equipment slow down your operations when production efficiency is so important in meeting today's changing business conditions. The new Noblewest production marking machines, such as Model 157 (illustrated) have been developed especially to meet industry's demand for higher marking speeds and lowest cost per unit marked. Leading manufacturers in many fields are saving time and money every day with these superior marking machines. Whatever you make—in metal, plastic, hard rubber, etc.—chances are you too can mark it faster, better, at lower cost with Noblewest. There's no obligation to find out. Just write Noble & Westbrook Manufacturing Co., 17 Westbrook Street, East Hartford 8, Conn.

MARK IT BEST WITH NOBLEWEST

EQUIPMENT FOR MARKING · GRADUATING · EMBOSSING · NUMBERING

MODERN TESTING METHODS— What they are... How to use them...

"Non-destructive Testing Methods", a 24-page *American Machinist* Special Report, gives all the facts on how to scientifically test parts, pieces, structural materials, rough castings, dies, and any other formed piece subject to defect.

This Special Report explains in detail the supersonic, radiographic, spectroscopic and magnetic methods of Inspection . . . points out how each can be used effectively. Illustrations, graphs, photographs, clarify the factual authoritative text.

Non-destructive testing, recognized as the most practical way of checking on a production basis, is particularly important because a thorough check at all points is possible without damage to the part or material being tested. This compact, up-to-the-minute survey on non-destructive testing goes into the many new or improved methods used today, points out their particular advantages.

If you would like copies for distribution to your staff or for your own ready reference, we have a limited number available for distribution at 10¢ each.

Just Write:

Reader Service Department

American Machinist

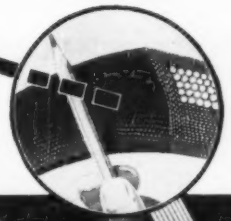
The McGraw-Hill Magazine of Metalworking Production

McGRAW-HILL BLDG. NEW YORK 18, N. Y.

This Simple Test
Shows Exactly How

The CONCAVE SIDE...
(U.S. Patent No. 1813698)

Saves You Money!



The Mark of SPECIALIZED Research

Pick up *any* V-belt having the ordinary straight sides and *bend* the belt. Three things will happen, right before your eyes.

(1) The top of the belt is under tension and grows *narrower.* (2) The body, under compression, becomes wider. (3) The sides of the belt *bulge out.* (Figures 1 and 1-A, below.)

Straight-Sided V-Belt

How Straight-Sided V-Belt Bulges in Sheave-Groove

This bulging of the straight-sided V-belt in its sheave-groove costs you money in *two* ways—(1) The bulge causes uneven sidewall wear—*shorter life!* (2) The bulging side cannot evenly grip the wall of the sheave groove—a loss in *transmission efficiency!*

In figures 2 and 2-A, you see how the precisely engineered *concave* side of the Gates Vulco Rope exactly corrects this bulging.

Gates Vulco Rope with Concave Side.

No Side Bulge. Precise Fit in Sheave-Groove.

Two distinct *savings* result. (1) The Gates Vulco Rope wears evenly—*longer life!* (2) The entire side-wall grips the pulley—carries heavier loads and *sudden load increases* without slippage—saves *belts* and also *saves power!*

The Concave Side is *MORE IMPORTANT NOW* Than Ever Before

Because the sides of a V-Belt are what actually drive the pulley, it is clear that any increased load on the belt means a heavier load that must be transmitted to the pulley directly through the belt's sidewalls.

Now that Gates *SPECIALIZED* Research has made available to you SUPER Vulco Ropes—carrying fully 40% higher horsepower ratings—the life-prolonging Concave Side is naturally more important in conserving belt life today than ever before.

496

GATES VULCO ROPE DRIVES
* Engineering Offices and Jobber Stocks IN ALL INDUSTRIAL CENTERS of the U. S. and 71 Foreign Countries

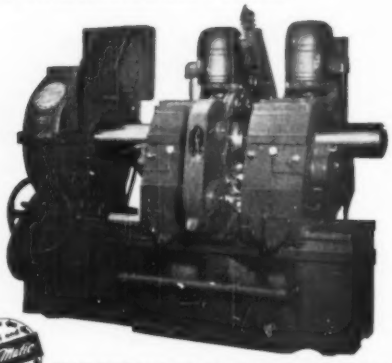
THE GATES RUBBER COMPANY
DENVER, U.S.A.
The World's Largest Makers of V-Belts

Roto-1-A-Matic

HORIZONTAL PRODUCTION MILLERS

FEATURING

1 CONTINUOUS OPERATION
2 AUTOMATIC CHAIN CLAMPING
3 ROUGH & FINISH CUTTERS — EACH HEAD
4 3 TYPES — VARYING BED LENGTHS
5 LOW MAINTENANCE COST
6 INTERCHANGEABLE FIXTURES



INDEPENDENTLY DRIVEN HEADS

No. 1-A ROTO-MATIC Millers have been produced for the past 30 years in various sizes and types to do specific jobs faster and better than they have ever been done before. Because of their flexibility they have been designed to take a wide range of work with uniform satisfactory results. Engineering has made possible the milling of several work pieces at one time giving a high production of each. In all cases exacting requirements as to quality of work have been met.

Chain Clamping Fixture for rough and finish milling both ends of Control Arm Trunions to length. Interchangeable buttons make possible the milling of several sizes — Production 296 gross per hour.

Double Chain Clamping Fixture with a total of 28 stations for milling ends of Clutch Gears — Production 200 gross per hour — With this arrangement two different parts can be milled simultaneously.

Double Drum — 50 automatic holding fixtures on each drum for rough and finish milling radius on Rocker Arms — Production 1400 gross per hour.

ASK FOR BULLETIN 121

DAVIS and THOMPSON CO.
MANUFACTURERS OF *Machine Tools*
MILWAUKEE 14, WISCONSIN

MAKE EXTRA MONEY!

You can earn extra money in your spare time by taking orders for technical books like the . . . .

BIG EIGHTH EDITION
of the

AMERICAN MACHINISTS' HANDBOOK

EVERY man in your shop will find this practical handbook as useful as any tool in his kit. Gives 1537 pages of dependable data on all branches of machine-shop and drafting room practice; over 2500 illustrations, diagrams, and tables all in one handy volume.

Our spare time representatives, in both large and small shops, have found it is easy and profitable to sell thousands of copies of this handbook. Here's your chance ot get your share. You can make extra money and help your fellow workers at the same time by supplying them with the technical books they need to improve their skill and prepare for advancement.

Be the book expert in your plant. Order the AMERICAN MACHINISTS' HANDBOOK or any other McGraw-Hill book for your associates and get a liberal commission on every sale.

MEN LIKE YOU HAVE EARNED THOUSANDS OF DOLLARS SELLING THIS AND OTHER McGRAW-HILL BOOKS.

WITHOUT obligation you can have full details of the McGraw-Hill Spare-time Agent Plan which includes catalogs, circulars and other sales aids at no cost to you.

•

MAIL THIS COUPON TODAY!

McGraw-Hill Book Co., 330 W. 42nd St., N.Y. 18, N. Y.

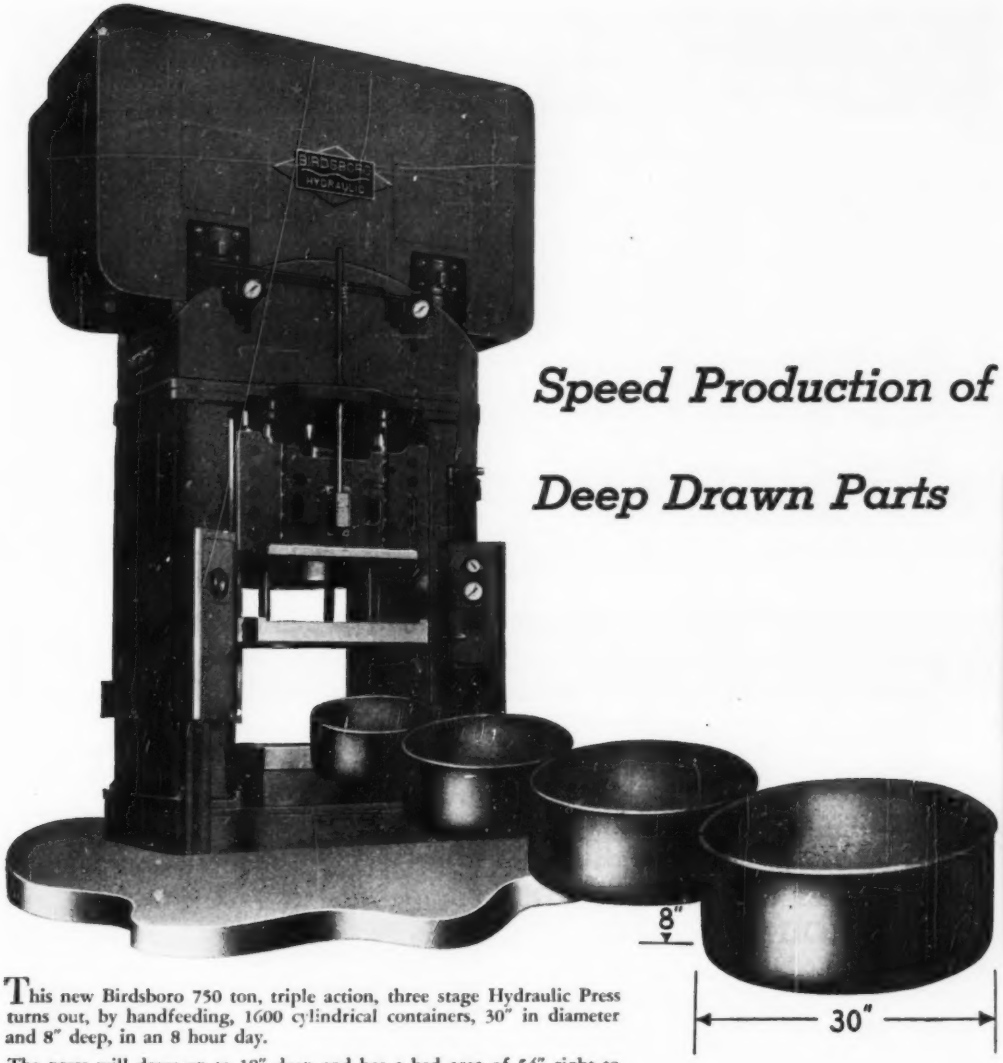
Please send me without cost or obligation to myself, the details of your plan whereby I can easily make extra cash in my spare time.

Name .....

Address .....

Company .....

Position .....AM-AG



Speed Production of Deep Drawn Parts

This new Birdsboro 750 ton, triple action, three stage Hydraulic Press turns out, by handfeeding, 1600 cylindrical containers, 30" in diameter and 8" deep, in an 8 hour day.

The press will draw up to 18" deep and has a bed area of 54" right to left, and 60" front to back. This is just another outstanding example of Birdsboro engineering at work. Our engineers will be glad to work with you on any press problems that may confront you now or in the future.

This versatile press is equally suitable for single and double action drawing operations, as well as blanking and coining. It is also available with built-in equipment for BULGING by "hydraulic pressure."

Agents in: Chicago, Illinois—Cincinnati, Ohio—Detroit, Michigan—Los Angeles, California—St. Louis, Missouri—Tulsa, Oklahoma.

Birdsboro Steel Foundry & Machine Co. • Birdsboro, Pa.

BIRDSBORO
HYDRAULIC PRESSES

BIRDSBORO HYDRAULIC

AGENTS IN:
Chicago, Ill.—Cincinnati, O.—Detroit, Michigan—Pittsburgh, Pa.—St. Louis, Mo.—Tulsa, Okla.—Boston, Mass.—Oklahoma City, Okla.—Kansas City, Mo.

DESIGNERS and BUILDERS of: Hydraulic Presses • Steel Mill Machinery • Rolls • Special Machinery • Crushing Machinery • Steel Castings

A Quick, Smooth, Uniform coating—assured by
BARRETT GALVANIZING AND HOT TINNING CENTRIFUGALS

BARRETT CENTRIFUGAL GALVANIZER is driven with high torque head and has an equalized disc brake for quick stop.

With the Barrett Whizo Galvanizer, excess metal is quickly removed from small parts after dipping in molten metal, in fact, much faster and more uniform production is assured. Parts will also pass the most rigid inspection for quality.

The method of handling is simple and easy. Work to be coated is placed in a round basket and submerged in molten metal. When thoroughly heated, the basket is placed in the Barrett Centrifugal to be immediately accelerated to high speed, the excess metal being thrown off before it can cool.

A quick pick up and stop (from 2 to 3 seconds each) assures maximum production with an even thickness of coating.

Machines furnished with or without heated surrounding drum, in capacities from 40 to 240 loads per hour, handling from 5 to 100 lb. loads. When used for tinning threaded work, rethreading has been found to be unnecessary.

Barrett Centrifugals are used extensively, combine speed with convenience of operation and the utmost in safety. They are highly developed to meet all reasonable requirements, have self-contained motor drive and occupy a minimum of floor space.

Send at once for full details of Barrett Centrifugal Galvanizer

THE LEON J. BARRETT COMPANY, 1800 Grafton Road, WORCESTER, MASS.

Designers and Builders of Centrifugal Machinery

The Monthly Robertson Bulletin

FOUR HOURS ON BLANCHARDS WITHOUT A SQUEAL

We were delighted when an electrical manufacturer said to us recently, "Let's see what this Robertson Segmental Wheel can do."

We were delighted because we know that people who thoroughly test Robertsons in their own shops soon become enthusiastic users—and boosters—of these unique wheels.

For four hours, this manufacturer ran everything in his shop through on the Blanchard—boiler plate, Neor, Hampden, cold-rolled and Hi-Carbon Hi-Chrome Steel. The wheel—an 18" x 5" x 15" WA301-H3V—took the work in its stride. The only difficulty experienced was "squealing" on boiler plate 24" x 10" x ½" thick. This was eliminated when table speed was increased from 6 to 12 rpm. Other than that, the entire test was run at 12 rpm with .012" down feed per minute.

On one Hi-Carbon Hi-Chrome die, of 65 Rockwell hardness, the work covered approximately one-third of the chuck area. In 15 minutes .050" stock was removed.

Wheel wear at the end of four hours' grinding was ⅛". The Robertson wheel was ½" narrower and required less dressing than former wheels used by this manufacturer. It gave longer life at lower wheel cost.

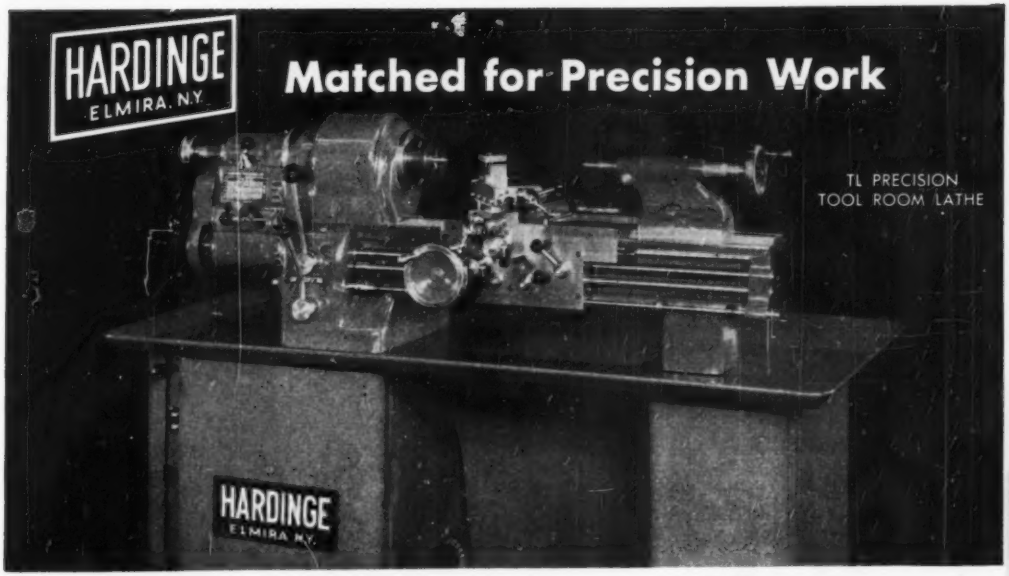
We invite *you* to give Robertson Cool-Cut Wheels the acid test at any time. Put them to work side by side with other wheels.. You'll be delighted at their ability to increase production at lower wheel cost—and you'll like the substantial bonus in decreased power consumption they make possible.

ROBERTSON MANUFACTURING COMPANY
TRENTON 5, NEW JERSEY

RESIN-BONDED AND VITRIFIED-BONDED GRINDING WHEELS • MOUNTED WHEELS • SEGMENTS

HARDINGE
ELMIRA, N.Y.

Matched for Precision Work



TL PRECISION
TOOL ROOM LATHE

TM PLAIN
MILLING
MACHINE

These Hardinge high speed precision machines, matched for interchangeable attachments, will step up precision production in your tool room, laboratory, and development departments. For example, all spindles take standard 5C HARDINGE 1" capacity collets, including the spiral or plain index centers for the milling machines.

Write for Descriptive Bulletins

HARDINGE BROTHERS, INC.
Elmira, N. Y.

WE 59
PRECISION LATHE

DSM 59 SECOND
OPERATION MACHINE

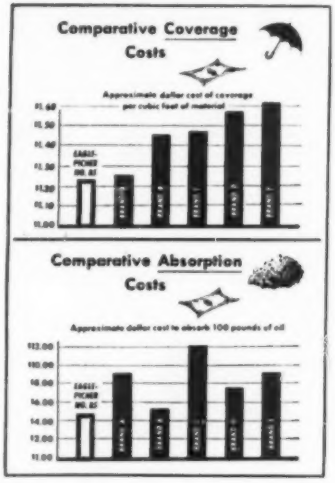
HP MULTI-OPERATION
CHUCKING MACHINE

"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

Offices in principal cities. Export office 269 Lafayette St., New York 12, N. Y.

Here's proof

Eagle-Picher Floor-Dry No. 85 gives you *More for your dollar!*


Comparative Coverage Costs
Approximate dollar cost of coverage per cubic foot of material
Comparative Absorption Costs
Approximate dollar cost to absorb 100 pounds of oil

Comparative scientific tests show that Eagle-Picher Industrial Floor-Dry #85 outperforms the five other leading brands of floor drying compounds.

Eagle-Picher Industrial Floor-Dry #85 is a granular mineral compound—chemically inert, non-combustible and insoluble in oil, grease, kerosene or water. It can give you positive reduction in operating costs plus greater safety. Write for complete information.

Packed in convenient 50-pound, multi-wall Kraft paper bags.

The Eagle-Picher Company

GENERAL OFFICES: CINCINNATI (1), OHIO

The Eagle-Picher Company
Department AM-69
Cincinnati (1), Ohio
Gentlemen: Please send me complete information about Eagle-Picher Industrial Floor-Dry No. 85.

EAGLE EP PICHER

Name _____

Address _____

City _____ *County* _____ *State* _____

One Man, One Machine FOUR HOBBING JOBS!

(also 6 and 8 Spindle Models)

HERE'S WHY it HOBS MORE for LESS!

- Automatic push-button control
- Automatic hob in-out mechanism
- Operator only loads and unloads
- More production per man
- Far less floor space required
- Maximum diameter 8-inch
- Maximum helix angle 45° R or L-Hand
- Massive, rigid construction

Write for Bulletin A-59

The LEES-BRADNER Company

CLEVELAND 11, OHIO, U.S.A.

For low-cost performance of

INDUSTRIAL RUBBER PRODUCTS

. . . use these practical application and maintenance aids

HERE'S a handy reference that gives you a thorough analysis of all important factors you must take into account when working with rubber in industry. Whether you're an engineer—designer—shop superintendent—industrial technician—no matter what your link with the rubber field . . . you'll find this concise treatment of the physical and chemical properties of rubber compounds a handy and practical guide.

JUST PUBLISHED!

ENGINEERING WITH RUBBER

Edited by Walter E. Burton

In collaboration with engineers and research men of the B. F. Goodrich Company

461 pages, 445 illustrations, $6.50

THIS reference book gives you the practical **engineering, application, maintenance** and **design** principles of molded, extruded and lathe-cut rubber, hose, gaskets, belting, and scores of other rubber parts used by industry. It illustrates uses for American-made rubbers, crude and reclaimed rubbers and rubber-like materials . . . presents a complete picture of the physical and chemical properties of rubber compounds, the typical dimensions and structural details of industrial rubber products.

This guide shows you how to reduce vibrations with rubber mountings—how to determine when extruded rubber parts can be used—how to use packing and sheet rubber, etc. Its tremendous store of useful information is ready to help you find the right answers, the first time, to your specialized design and construction problems.

Stage-by-stage procedures show you:

- how to select and use rubber adhesives
- how latex parts can improve product design
- how to engineer and install V-belt drives
- how to select rubber linings to withstand chemical action
- how to design and install conveyor belt systems
- how to work and use hard rubber
- how to specify correct types of rubber hose for best service
- how lathe-cut rubber can reduce costs

SEE IT 10 DAYS' FREE—MAIL COUPON TODAY

McGraw-Hill Book Co., Inc., 330 W. 42 St., N.Y.C. 18

Send me a copy of Burton's **ENGINEERING WITH RUBBER** for 10 days' examination on approval. In 10 days I will remit $6.50, plus few cents for delivery, or return book. (We pay for delivery if you remit with this coupon. Same return privilege.)

Name .....

Address .....

City ..... Zone ..... State .....

Company .....

Position A-6-16-49

Books sent on approval in U. S. and Canada only.

The most versatile fixture for quick accurate indexing

...SUPER-SPACER

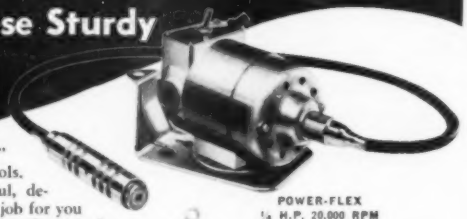
This fixture allows rigid control of accurate machining operations within its scope at speeds and feeds limited only by the capacity of the holding means and the power of the machine.

Standard mask plates have 2, 3, 4, 6, 8, or 12 divisions. Specials made to order. All Super-Spacers come complete with mask plates, Universal chuck and chuck wrench. Write for Bulletin S-101.

HARTFORD *Special*

The HARTFORD SPECIAL MACHINERY Co., Hartford 5, Conn.

You Can Grind • File • Polish • Burr
EASIER—FASTER—BETTER
With These Sturdy Dumore Tools



You don't have to "baby" Dumore Flexible-shaft tools. They're rugged, powerful, dependable tools that do a job for you shift after shift, day after day. And that holds good whether they work on tough continuous-duty production jobs, or on delicate and exacting toolroom operations.

3 Types to Choose From

Choose the Dumore that fits each of your particular jobs. You have a range of speeds, capacities, power, and control to cover every requirement for high-speed work. And each of the three gives you the same important basic operating advantages.

- A strong, durable shaft — with high flexibility for easy maneuvering.
- Light, sensitive, cool-running handpieces for easy work and close-control.
- Powerful, vibration-free Dumore motors built for long, trouble-free service.

Cost-Cutting Versatility

Put these cost-cutting Dumore tools to work in your shop. Use them on all off-hand operations. Build low-cost automatic set-ups around one or more — They make dependable, efficient workheads.

POWER-FLEX
¼ H.P. 20,000 RPM
$69.50

UNI-FLEX
1/15 H.P.
15,000 RPM
$44.75

DUO-FLEX
1/15 H.P. 500-3500
(Gear Shaft)
3000-15,000 RPM
(Motor Shaft)
$52.60

Choice of 2 Handpieces

No. 2-203: Ball bearings; 0-¼" geared chuck. (Standard with Uni-Flex and Duo-Flex. Can also be used on Power-Flex).

No. 2-204: Ball bearings; ¼" capacity chuck with ¼" collet. (Standard with Power-Flex).

Foot Rheostats

To give you speed variation or to leave both hands free — rugged foot-control rheostats are available for all these machines.

FREE — complete facts in Bulletin No. 264

TEAR OUT THIS COUPON AND MAIL TODAY

The Dumore Co., Dept. F-14, Racine, Wisconsin
Please send me FREE Flexible-shaft Bulletin 264

Name.....Position.....
Company.....
Company Address.....
City.....(....) State.....

G-20

SCHERR *aids to precision – production*

- OPTICAL COMPARATORS
- TOOLMAKER MICROSCOPES
- BINOCULAR MICROSCOPES
- COMPARATOR GAGES
- GEAR TESTERS
- HEIGHT GAGES
- ILLUMINATED MAGNIFIERS
- GAGE BLOCKS
- VERNIER CALIPERS
- MICROMETERS
- TACHOMETERS
- SNAP GAGES
- "MAGNE-BLOX" for magnetic-chucks

BULLETINS ON REQUEST

GEO. SCHERR CO., Inc.
200-D Lafayette St. New York 12, N. Y.

CUTTERS

for

FLAT BARS • RODS • ANGLES
WIRE ROPE

These hand power, lever action bench cutters have the efficient design and rugged construction that characterize the Lewthwaite line of tools.

•

Carried in stock for immediate shipment in three sizes

•

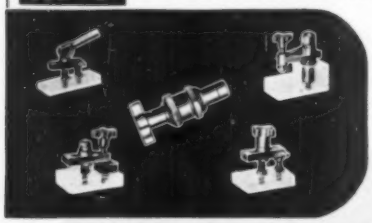
Sixty years of continuous production

•

We will gladly send you circulars illustrating and describing our line.

T. H. LEWTHWAITE MACHINE CO., INC.
313 East 47th St., New York 17, N. Y.

M-T FIXTURE CLAMPS AND COMPONENTS



BE DOUBLY SURE with M-T QUALITY

FIXTURE CLAMPS—wide range of sizes and types to fit every requirement.

JACK LOCKS . . . Cam Locks . . . Hand Knobs . . . Hand Wheels . . . Steel Ball Handles . . . Soft Chuck Jaw Blanks . . . Fixture Cams . . . Alloy Set-up Studs . . . Rest Buttons and Rest Pads . . . Spherical and Plain Collar Nuts . . . Quarter Turn Screws . . . Fixture Keys . . . Spherical and Flat Washers . . . Shoulder Screws and many other items from stock.

Write for Complete Catalog.

MORTON MACHINE WORKS
2421 WOLCOTT ST. FERNDALE 20, MICH.

Use

ALOX

for Metal Cutting

for Lubrication

for Prevention of Rust

In place of animal fats and vegetable oils to save cost and provide stability in metal cutting lubricants, greases, and steam engine oils, etc.

In the preparation of preservative lubricants for the shipment of engines and replacement parts.

In the preparation of automotive, diesel and industrial oils of enhanced lubricity and detergency.

In the preparation of film-forming rust preventives, which will guarantee the safe arrival of overseas shipments of metal goods.

Write for samples and compounding instructions.

Write directly attention RESEARCH DIRECTOR

ALOX CORPORATION

3924 4UFFALO AVENUE

NIAGARA FALLS, NEW YORK

WOODWORTH

Cone Lok JIGS

MINNIE JIG—for small work in 2 sizes: 1″ x 1″ and 1″ x 2″ working area.

STYLE 3—up-clamp type for controlled depth of machining; sizes from 4″ x 6″ to 9″ x 12″.

STYLE 1—most popular design for average work; sizes from 2″ x 4″ to 6″ x 8″.

STYLE 4—engineered for larger work in sizes from 5″ x 5″ to 9″ x 30″.

ALL STYLES EQUIPPED WITH FAMOUS WOODWORTH "LIFE TIME" LOCK —ALL SIZES CARRIED IN STOCK

ACCURACY YOU CAN TRUST

WOODWORTH

N. A. WOODWORTH CO. • 1300 EAST NINE MILE ROAD • DETROIT 20, MICHIGAN

PRECISION GAGES • DIAPHRAGM CHUCKS • CONE-LOK JIGS • PRECISION PARTS

ANSWERS HUNDREDS OF QUESTIONS ON MACHINE-SHOP PRACTICE! . . .

THINK of being able to get a quick, accurate answer to any question on layouts, feeds, speeds, tools, jigs, fixtures, materials standards, tolerances, etc. This volume brings you facts and figures on many different materials, practices and processes, effective substitute uses, pointers on machining special metals, and methods for difficult operations in drilling, grinding, punching, etc.

AMERICAN MACHINISTS' HANDBOOK

By Fred H. Colvin and Frank A. Stanley

8th Edit. • 1537 pp • over 2500 illus. • $7.00

SEE IT 10 DAYS FREE

McGRAW-HILL BOOK CO., 330 W. 42d St., NYC 18

Send me Colvin and Stanley's **AMERICAN MACHINISTS' HANDBOOK**, 8th Edition, for 10 days' examination on approval. In 10 days I will send $7.00, plus a few cents for delivery or return the book. (We pay for delivery if you remit with this coupon; same return privilege.)

Name .....

Address .....

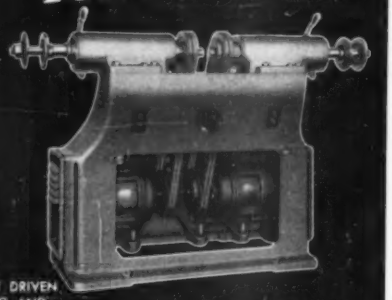
City ..... Zone ..... State .....

Company .....

Position F-AM-49

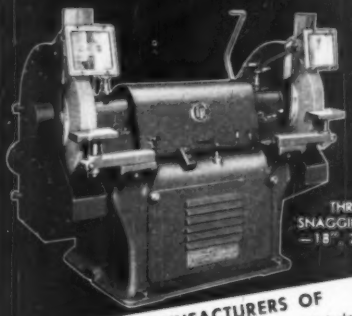
Books sent on approval in U. S. and Canada only

The Cincinnati
TRADE MARK
TRADITIONALLY FINE TOOLS!



VEE BELT DRIVEN BUFFING AND POLISHING LATHES 3, 5, 7½, 10 AND 15 H.P. —SINGLE OR DOUBLE MOTOR

WET ABRASIVE CUT-OFF MACHINE. CAPACITY: 2¼" SOLIDS— 3½" TUBING



THREE-SPEED SNAGGING GRINDERS —18", 20", AND 24"

MANUFACTURERS OF

Electric Drills
Screw Drivers
Nut Setters
Tappers
Routers
Portable Grinders
Tool Post Grinders
Speed Lathes
Bench and Pedestal Grinders
Bench and Pedestal Buffers
Abrasive Cut-off Machines
Air Master Dust Collectors

TRADE The Cincinnati MARK

THE CINCINNATI ELECTRICAL TOOL CO.
Division of THE R. K. LeBLOND MACHINE TOOL CO.
2615 MADISON ROAD • CINCINNATI 8, OHIO

GETTING ACQUAINTED WITH YOUR AMERICAN MACHINIST EDITORS

Managing Editor Tangerman is widely respected for the authority with which he can discuss your industry's problems . . . for the thoroughness with which he applies himself to bringing AMERICAN MACHINIST readers the latest data on specific Metalworking subjects . . . for the completeness of his personal working knowledge of every phase of Metalworking.

During the eighteen years he has been a McGraw-Hill editor, Mr. Tangerman has maintained close and constant contact with Metalworking through personal field work and through the many technical societies of which he is a member.

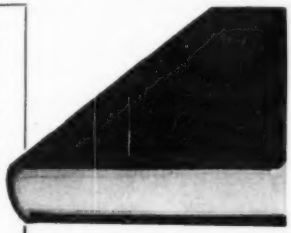
American Machinist
McGRAW-HILL BUILDING
NEW YORK 18

HOW TO GIVE METAL PRODUCTS THE RIGHT FINISH . . .

Here are economical, sales-building methods that produce more attractive products

SUPPLIES UP-TO-DATE INFORMATION ON:

—the techniques involved in metal finishing
—the commercial aspects of metal finishing
—the sales value of attractive finishes
—the economics of metal finishing
—the design of parts which require finishing
—new finishing equipment and processes
—metal finishing costs



HERE'S a manual which demonstrates the vital importance of the finishing process in the final appearance and sales appeal of a product and describes each of these processes in careful detail so that you may achieve an attractive finish as efficiently and economically as modern methods will allow. With special attention to improving results and reducing costs, the book covers all types of finish, such as galvanizing, polishing, plating, lacquering, enameling and painting—wood grain reproduction, chromium plating, and synthetic enamels, and many new finishes of a specialized nature.

FINISHING METAL PRODUCTS

By HERBERT R. SIMONDS
Consulting Engineer

and ADOLPH BREGMAN
Consulting Engineer, Executive Secretary, Masters Electro-Plating Association

Second Edition

352 pages, 5¼ x 8¼, 147 figures, $4.00

The revised edition of this highly useful manual describes many new developments, and incorporates the rapid progress in plastics and synthetic resins. Chapters on coloring metal, on costs and estimates and on organic coatings have been added. Answers to every kind of question which arises in connection with the finishing processes are supplied in careful detail, aiming at the most efficient and economical means of achieving a highly attractive finished product with a maximum of selling appeal.

Read this partial list of chapter headings for a few of the important processes and topics described:

- Sales Value of Attractive Finish
- Importance of Color
- How to Minimize Cleaning Expense
- Pickling for a Better Finish
- Polishing in Industry
- Designing Products to Reduce Polishing Expense
- Recent Developments in Plating
- Chromium Plating
- Spray Coating
- Electroplating Costs and Estimating
- Synthetic and Novelty Finishes
- Enamelling and Lacquering
- Coloring Aluminum
- Porcelain Enamel

See the book 10 days FREE • Mail Coupon

McGRAW-HILL BOOK CO., 330 W. 42 St., NYC 18

Send me Simonds and Bregman's FINISHING METAL PRODUCTS for 10 days' examination on approval. In 10 days I will send $4.00, plus few cents for delivery, or return book. (We pay for delivery if you remit with this coupon; same return privilege.)

Name .....
Address .....
City ..... Zone ..... State .....
Company .....
Position F-AM-19

BOOKS SENT ON APPROVAL IN U.S. AND CANADA ONLY.

It's always wise to "Try U·S First" when you need stainless steel. For it's a fact that U·S·S Stainless Steel is "tops" in quality, dependability and proven excellence.

Right now our stocks include No. 2B Finish Sheets "par excellence;" No. 4 Finish Sheets of uniform quality. Also bars, meeting high standards of machinability; plates up to 120" wide and 360" long . . . as well as welded and seamless tubing, pipe, angles, channels, welding electrodes in all standard grades and specifications are on hand for your needs.

So contact our nearest warehouse or sales office. You'll get prompt, courteous service. Meanwhile, fill in and return the coupon for our free booklets on U·S·S Stainless Steel. Do it now.

United States Steel Supply Company
Dept. EE-6-16, 208 S. La Salle St., Chicago 4, Ill.
Without obligation on our part, please send us FREE booklets on U·S·S Stainless Steel as checked below:

☐ Fabrication Book ☐ Food Handling and Processing ☐ Petroleum Industry

Name..... Title.....
Firm Name.....
Address.....
City..... Zone..... State.....

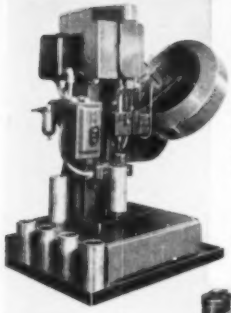
UNITED STATES STEEL SUPPLY COMPANY

Warehouses: BALTIMORE · BOSTON · CHICAGO · CLEVELAND · LOS ANGELES · MILWAUKEE · MOLINE, ILL. · NEWARK · PITTSBURGH · PORTLAND, ORE. · SAN FRANCISCO · SEATTLE · ST. LOUIS · TWIN CITY (ST. PAUL)
Also Sales Offices at: KANSAS CITY · PHILADELPHIA · TOLEDO · TULSA · YOUNGSTOWN
Headquarters Offices at: 208 S. La Salle St.—Chicago 4, Ill.

USS

UNITED STATES STEEL

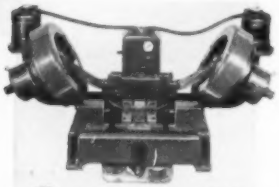
Yes! WE DO MAKE *Special* ASSEMBLING MACHINES



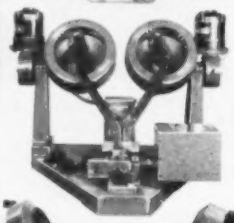
Motorized Hopper Units by the Detroit Power Screwdriver Company are "tailor-made" for special assembling applications . . . They eliminate the manual handling of parts . . . Let us solve your production assembling problem . . . Contact us now; send special assembly and component parts for quotation.

•

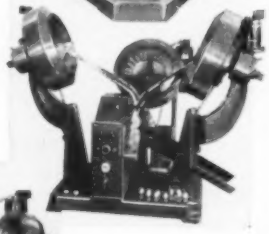
Pressing terminal studs in dry cell batteries.



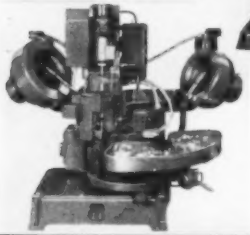
Assembling small hardware hinges by inserting two hinge pins simultaneously.



Inserting mounting screws in cooking utensil handles.



Automatic assembly of toy plastic wheels and axles.



Assembling screw and fibre washer to cable clamp for electrical outlet box for shipping purposes.

DETROIT POWER SCREWDRIVER CO.

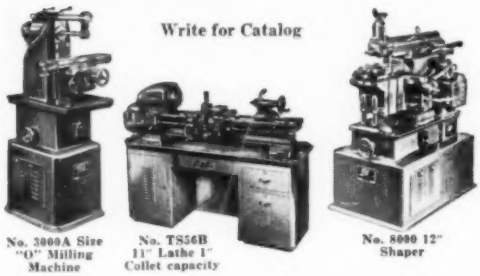
2797 W. FORT ST. • DETROIT 16, MICH.

SHELDON

Makes ALL THREE

These 3 precision machine tools are a necessary part of every completely tooled shop . . . a modern precision lathe with "Zero Precision" tapered roller bearings that will retain its extreme accuracy at new high operating speeds . . . a convenient back-geared shaper that embodies all major improvements . . . a capable small milling machine that will do accurate work . . . all three are extremely moderate in price.

Write for Catalog



No. 3000A Size "O" Milling Machine

No. TS56B 11" Lathe 1" Collet capacity

No. 8000 12" Shaper

SHELDON MACHINE CO. Inc.

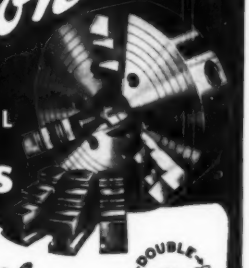
Manufacturers of Sheldon Precision Lathes • Milling Machines • Shapers

4234 N. KNOX AVENUE CHICAGO 41, ILLINOIS, U.S.A.

Whiton

UNIVERSAL LATHE CHUCKS

All types of mountings



TWO WHITON EXCLUSIVES ASSURE LONGER LIFE

DOUBLE BUSHED

1. Chrome plated scroll threads and scroll bore give maximum wear and minimum backlash.
2. Renewable hardened bushings at either end of pinions give long wearability and stabilize pinion end play.

Rigid individual process inspection and exhaustive tests after assembly guarantee chuck users the best in work holding. If you have a work holding problem, WRITE WHITON. Ask for catalog No. C-47.

Makers of Fine Chucks • Steam Turbines
Centering Machines • Gear Cutting Machines

THE WHITON MACHINE COMPANY
NEW LONDON, CONN.

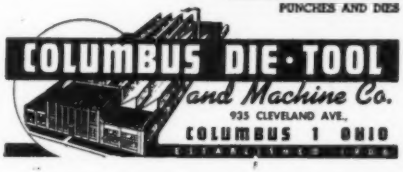
ACCURACY

Efficiency

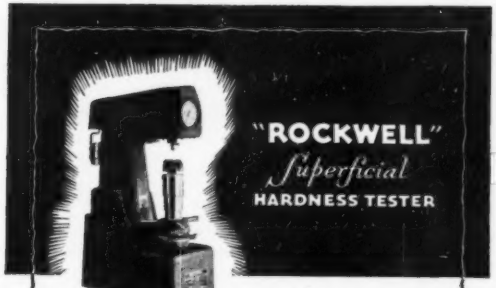
Economy

These three factors are the key-note of our special tools and machinery. Columbus Die-Tool builds and designs the tool for your particular purpose and will solve the toughest tooling problems effectively and promptly. *Do* not hesitate to consult us, our experience in this field is most comprehensive.

DGS • FIXTURES • SPECIAL TOOLS
BUILDING COMPLETE MACHINE TOOLS
UNITS FOR MACHINE TOOLS
PUNCHES AND DIES



COLUMBUS DIE-TOOL and Machine Co.
935 CLEVELAND AVE.
COLUMBUS 1 OHIO
ESTABLISHED 1906



"ROCKWELL" *Superficial* HARDNESS TESTER

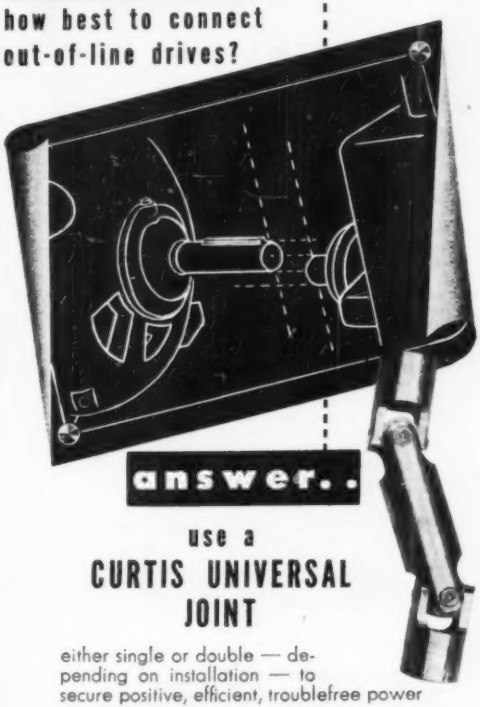
. . . with many uses, but only one standard of precision

• For research, supervision or control—in laboratory, toolroom or production line—tests made by the "ROCKWELL" Superficial are as representative of hardness as those made on the regular "ROCKWELL" Hardness Tester. Only requirement is that, since depth of indentation is only .005" or less, surfaces must be smooth and materials homogeneous for general testing.

This instrument is especially suitable for testing very thin materia., nitrided or lightly carburized steel and areas too small for regular "ROCKWELL" Hardness Tests. A Wilson Field Service Engineer will be glad to discuss with you whether or not a "ROCKWELL" Superficial Hardness Tester will best serve your needs.

WILSON MECHANICAL INSTRUMENT CO., INC.
AN ASSOCIATE COMPANY OF AMERICAN CHAIN & CABLE COMPANY, INC.
ACCO
230-B PARK AVENUE, NEW YORK 17, N. Y.

problem...
how best to connect out-of-line drives?



answer..
use a
CURTIS UNIVERSAL JOINT

either single or double — depending on installation — to secure positive, efficient, troublefree power transmission.

Curtis Universals insure delivery of positive rotation to driven shaft from driving shaft and can permit compensation for variations in distances between shaft ends where necessary.

Curtis Quality Universal Joints contribute to efficient, smooth performance and low maintenance of your machine tools, electronic apparatus, transformer tap changers, multi-spindle drill heads, etc. Machined to the closest practical tolerances from special heat treated alloy steels, the precision and quality of Curtis Universals are zealously watched by experienced craftsmen — many of whom have been with Curtis for years.

Available from stock in 14 sizes. Either single or double, furnished with solid hubs or with hubs bored one half the O.D.

Be sure of the best — Specify Curtis.

Write Dept. B-3

CURTIS UNIVERSAL JOINT CO. INC. SPRINGFIELD MASS.

Investigate

THE POSSIBILITIES OF THE NATIONAL KEYSEATING MILLER *on Your Work*

• Shops all over the country are solving difficult keyseating problems by chucking this attachment on their drill presses, radials and horizontal boring mills—and milling keyseats in pieces too large or bulky for convenient handling on keyseating machines.

The "National" goes through the hole once and mills keyseats with parallel sides and parallel with the axis of the bore. It's a big time and money saver and is available in standard stock diameters from ½" to 3½" for cutting lengths from 1⅞" to 12". It will keyseat in blind holes, and offset holes. We also manufacture oil-grooving millers.

WRITE today for Catalog No. 16

Several widths of cutters can be used with each size miller and many different hole diameters keyseated with one tool through the use of eccentric bushings.

NATIONAL MACHINE TOOL CO.
CINCINNATI 22, OHIO

BUILT RIGHT! PRICED RIGHT!

GREAVES No. 2-H MILLING MACHINE PLAIN OR UNIVERSAL

Simple in design. Easy to operate. Rigid construction including every worthwhile modern feature of milling machine development. With 18 spindle speeds 120 to 1000 R.P.M. both the universal and plain millers are readily adaptable for heavy duty or light precision production work. Send for bulletin.

Send for bulletins and price list

***Greaves* MACHINE TOOL CO.**
2021 EASTERN AVENUE CINCINNATI 2, OHIO

STAMPINGS *In Small Lots*

Lowest Possible Die Costs

DAYTON ROGERS
Manufacturing Company
Minneapolis (7), Minn.

ABRASIVE SURFACE GRINDERS
ABRASIVE MACHINE TOOL CO., EAST PROVIDENCE 14, R.I.
AGENTS IN PRINCIPAL CITIES

DAVIS KEYSEATER

This low cost machine will handle internal keyseating jobs up to 1¼ in.

Write for illustrated bulletin.

DAVIS KEYSEATER CO., 403 Exchange St., Rochester, N. Y.

WALTHAM SUB-PRESSES...

. . . for precision work

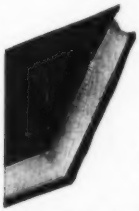
Arch Sub-Press

The cylindrical plungers in the Waltham Sub-presses slide in babbitted bearings. This bearing is tapered on the outside and can be forced downwards, thus reducing the inside diameter to fit the plunger when the latter becomes worn through use. Exact alignment and constant precision can be maintained throughout the life of the die. Write for information about the nine sizes.

Overhang Sub-Press

WALTHAM MACHINE WORKS
HIGH STREET, WALTHAM, MASS.

Quick aid in solving practical design problems



SEE THIS BOOK 10 DAYS FREE

HERE'S a compilation of design standards and methods of design procedure actually used in engineering design departments. This handy book makes available time-saving ideas and data for the designer of industrial machinery and equipment . . . brings together in authoritative form scores of quick-use monograms, charts, tables, check-lists, etc., that can help you solve your problems more efficiently.

Handbook of MECHANICAL DESIGN

By **GEORGE F. NORDENHOLT**, Editor of *Product Engineering*, **JOSEPH KERR**, Managing Editor of *Product Engineering*, and **JOHN SASSO**, Formerly Managing Editor, *Product Engineering*

285 pages, 8 x 11, 555 illus., $5.00

MOST of the book consists of material that has appeared in *Product Engineering*—material the engineer will use right at the drafting board, for quick, ready aid in scores of practical design problems. Calculations, properties of materials, production factors of design, and similar material is well represented. Other chapters give a great many basic designs for fastenings, mechanisms, drives, controls, etc., readily adaptable to a wide number of applications. Over 500 illustrations, many of which are engineering drawings of design details, are included.

8 chapters packed with data:

1. Charts and Tables
2. Materials
3. Beams and Structures
4. Latches, Locks, and Fastenings
5. Springs
6. Power Transmission Elements and Mechanisms
7. Drives and Controls
8. Design Data on Production Methods

FREE EXAMINATION COUPON

McGRAW-HILL BOOK CO., INC.
330 W. 42nd St., New York 18

Send me Nordenholt, Kerr, and Sasso's **HANDBOOK OF MECHANICAL DESIGN** for 10 days' examination on approval. In 10 days I will remit $5.00, plus a few cents for delivery, or return book. (We pay for delivery if you remit with this coupon; same return privilege.)

Name .....

Address .....

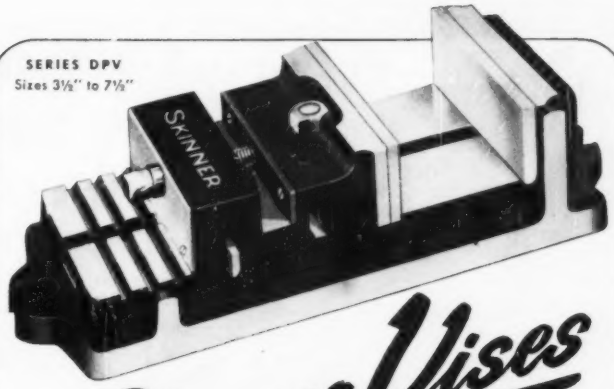
City ..... Zone ..... State .....

Company .....

Position F-AM-49

Books sent on approval in U.S. and Canada only.

SERIES DPV
Sizes 3½" to 7½"



Skinner Vises

ACCURATE, FAST ACTING, POSITIVE GRIPPING

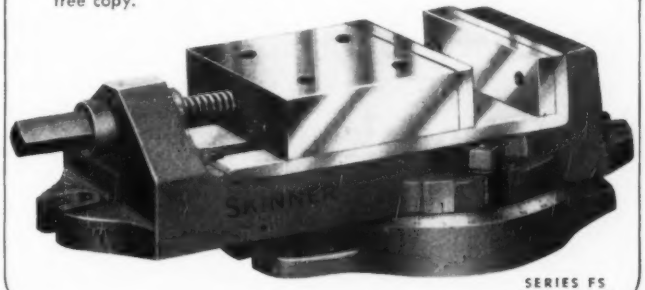
Skinner machine vises are built with tool-makers' accuracy with many unique features to assure quick action, positive gripping and long life. They are profitable additions to your oldest or newest machine tool equipment.

Series DPV wrench-operated Vises have semi-steel body and hardened and ground work holding surfaces. They have all the universal features so necessary for drill press operations. Clamp the work for drilling in one plane — drill — turn the vise on edge for all right angle drilling operations.

Series FS Vises have swivel base for accurate indexing necessary in milling operations. Top of the movable jaw is ground parallel to the base for use as an indicating base for setting cutters, trueing work, etc.

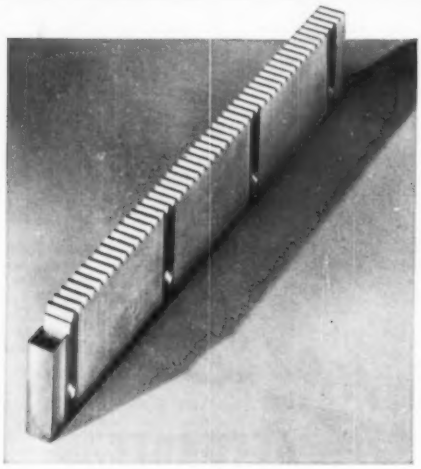
Details on the complete line of Skinner Vises are contained in Catalog No. 61. Write for free copy.

SKINNER CHUCK — THE CREST OF QUALITY



SERIES FS
Sizes 5" to 8"

The Skinner Chuck Co. 343 CHURCH STREET, NEW BRITAIN, CONN.



KEY TO PRECISION GEAR TESTING

● What you see is far more than a rack. It is a Kodak Conju-Gage Worm Section, and it corresponds in form to a single, non-backed-off flute of a gear-cutting hob.

It's the basis of the accuracy and versatility of Kodak Conju-Gages, a new group of instruments for precision testing of gears from the smallest watch pinions to those with 8¼-inch pitch diameter.

A single section is accurately conjugate to gears of any helix angle and diameter as long as the normal pitch and pressure angle are the same. In the Kodak Conju-Gage, it can check for the composite effects under working conditions of runout, pitch error, profile error, tooth thickness variation, crown and taper, and lateral runout.

The accuracy of the Worm Section itself is easily checked, and it can be reground repeatedly to its original specifications.

If you want to reduce inspection costs and at the same time cut down unnecessary rejections of gears, you should get all the details about Kodak Conju-Gages. We shall gladly send you full information.

EASTMAN KODAK COMPANY
Industrial Optical Sales Division, Rochester 4, N. Y.

Kodak
CONJU-GAGE

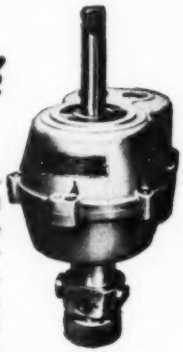
"Kodak" is a trade-mark

Kodak

TOOL UP FOR THRIFTY TAPPING and THREADING

Ettco-Emrick TAPPERS

attached to your drill press spindle offer a low-cost way to tool up any drill press for a wide range of tapping needs. Hair-trigger sensitive clutch protects taps and work. Ettco Tappers are ideal where cost, production and accuracy are important factors. Quill clamps are available for maximum rigidity.



7 sizes for No. 0 to 1" Taps

5 sizes for No. 6 to ⅝" dies

Ettco-Emrick THREADERS

are standard Ettco Tappers fitted with acorn or button-type die-holders and dies. They put threading work on a high-speed production basis. Their highly sensitive action assures accurate, low-cost work.

WRITE FOR BULLETIN 22 — FREE

It gives details and prices on Ettco-Emrick Tappers and Threaders, which are available at leading mill supply houses throughout the country.

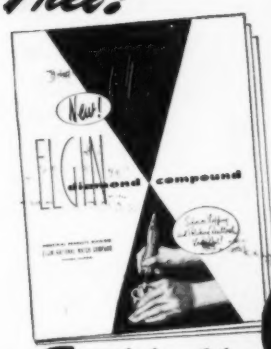
ETTCO TOOL CO.

590 Johnson Avenue, Brooklyn 6, N. Y.

Boston, Mass. ● Portland, Conn. ● Detroit, Mich. ● Chicago, Ill.

DRILL & TAP CHUCKS • TAPPING ATTACHMENTS
MULTIPLE DRILLING & TAPPING HEADS
DRILLING & TAPPING MACHINES

Free!



plastic molds

cutting tools

CUTS FINISHING COSTS!

bearing surfaces

drawing dies

Send for Your Copy Today!

Substantial time savings on finishing operations are certain when you use the new *Elgin Diamond Compound!* Lapping and polishing results of the highest quality are now possible at greatly reduced cost. Learn all about this faster and better finishing method. Write for illustrated literature now!

INDUSTRIAL PRODUCTS DIVISION
ELGIN NATIONAL WATCH COMPANY
AURORA, ILLINOIS

McCROSKY
Adjustable Blade REAMERS

You'll produce more pieces—better—in shorter time with McCrosky Adjustable Blade Reamers. Their heat toughened alloy steel bodies, the special heat treatment given the blades, and the ground threads on the bodies and adjusting collars, assure unsurpassed efficiency and accuracy.

McCrosky reamers cut freely without chatter. They avoid any tendency to "dig in," and produce absolutely round, accurately dimensioned holes. Blades can be released easily—and adjusted and reground quickly and accurately, saving time and increasing output.

Machine chucking and shell designs. High speed, cast alloy or carbide tipped blades. *Let us quote on your requirements.*

Bulletin No. 17-R { Gives full details / Send for a copy

COST CUTTING TOOLS
McCROSKY TOOL CORPORATION
MEADVILLE, PA.

Jack-Lock® MILLING CUTTERS
Adjustable BLADE REAMERS
Quick-Change CHUCKS
Turret TOOL POSTS
Block Type BORING BARS
SPECIAL *Multiple Operation* TOOLS

JEWELS
of all kinds for INSTRUMENTS
CLOCKS, METERS, WATCHES
JEWEL SCREWS SET TO ORDER
Precision and Large-Scale Production

SWISS AMERICAN JEWEL BEARINGS CO.
34-15 36th STREET LONG ISLAND CITY 1, N. Y.

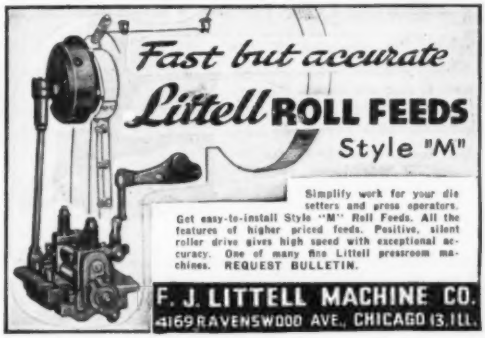
Famous for

- ACCURACY OF THREADS
- LOW CHASER COST
- ALL AROUND DEPENDABILITY

Bulletins available: General Purpose Die Heads, Insert Chaser Die Head, Threading Machines.

See our Advt. on Page 39 Feb. 10, '49 American Machinist

THE EASTERN MACHINE SCREW CORP., 28-40 Barclay St., New Haven, Conn.
Pacific Coast Representative: A. C. Behringer, 854 N. San Pedro St., Los Angeles California. Canada: F. F. Barber Machinery Co., Toronto, Canada.

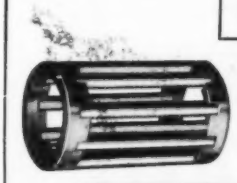


Fast but accurate *Littell* ROLL FEEDS
Style "M"

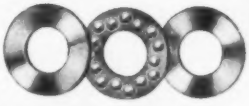
Simplify work for your die setters and press operators. Get easy-to-install Style "M" Roll Feeds. All the features of higher priced feeds. Positive, silent roller drive gives high speed with exceptional accuracy. One of many fine Littell pressroom machines. REQUEST BULLETIN.

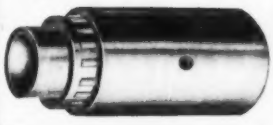
F. J. LITTELL MACHINE CO.
4169 RAVENSWOOD AVE., CHICAGO 13, ILL.

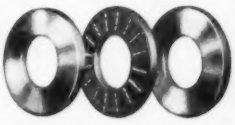
B & RB PRECISION BEARINGS



Are selected for dependability and greater capacity. Standard sizes are carried in stock.
Write for our general catalog No. 19
THE BALL AND ROLLER BEARING CO.
DANBURY, CONNECTICUT







RIDERMIKROKATOR
...for OUTSIDE MEASUREMENTS

The Ridermikrokator is intended for checking out-of-roundness and diameters of cylindrical parts. As the measurements are carried out according to the three point principle the instrument can be used to good advantage for checking centerless-ground pieces.

They are provided with hardened ground and lapped anvils and insulating grips. The measuring surfaces of the anvils can be tipped with cemented carbide. Price on application.

This instrument is supplied with removable measuring points with ranges from 3/16" to 4¾".

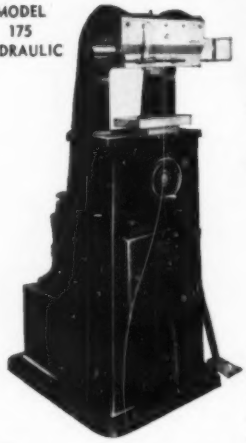
Prices and Literature Upon Application

Setting ridermikrokator by means of a master.

SWEDISH GAGE CO. OF AMERICA
8900 ALPINE AVE., DETROIT 4, MICH.

MARK IT FOR MARKET
PERMANENT — LEGIBLE — FAST

MODEL 175 HYDRAULIC



MARKING BY ROLLING...
PART NUMBERS..
SERIAL NUMBERS...
TRADEMARKS...

Rolled into your parts with GTS Marking Tools.

Send prints of parts showing desired marking and its location for free recommendation.

GEO. T. SCHMIDT, INC.
1810 W. BELLE PLAINE AVENUE
CHICAGO • 13 • ILLINOIS

BUZZER *Gas* FIRED FURNACES

2400° F. *Attainable Quickly Without Blower or Power*—just connect to your gas supply. Efficient and economical to operate. Temperatures easily controlled.

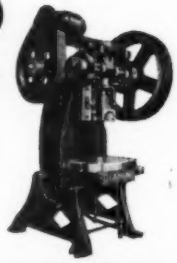
High Speed Full Muffle Furnaces designed for High Carbon and Alloy Steels. Also Semi-Muffle Furnaces for Low Carbon Steels, Preheating and Other Uses. Send for Catalog of Gas Furnaces, Burners, and other equipment

CHARLES A. HONES, INC.
121 So. Grand Ave. Baldwin, L. I., N. Y.

DIAMOND
Punch Presses

9 TON BENCH MODELS TO 56 TON GEARED PRESSES

Write FOR COMPLETE CATALOG



DIAMOND
DIAMOND MACHINE TOOL COMPANY
3419 EAST OLYMPIC BLVD., LOS ANGELES 23, CALIF.
OFFICE AND WAREHOUSE IN CHICAGO

"Anti-friction Bearings Throughout"

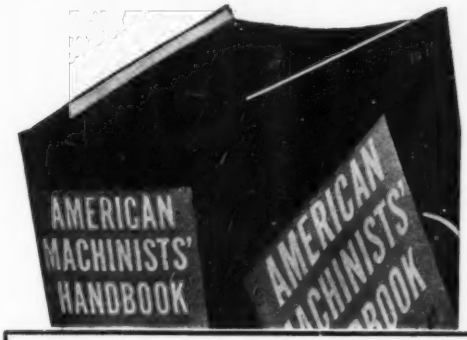
CARLTON RADIAL DRIL

FEATURES: 1. Low Hung Drive to Spindle. 2. All Power Driven Parts Running in Oil. 3. Quiet Running at all Speeds. 4. Concentrated and Convenient Push-button Controls. 5. Constructed on Unit Principle.

THE CARLTON
MACHINE TOOL COMPANY
CINCINNATI 25, OHIO, U. S. A.

The answers to hundreds of questions on machine-shop standards and practice—

in everyday machine-shop work



HERE is a standard and universally-used technical handbook, an indispensable tool for everyday machine-shop work. Over 1500 pages of clear, concise, constantly useful data—the book recognized everywhere as the standard manual of data, methods and definitions for apprentices, machinists, toolmakers, draftsmen, designers, foremen, superintendents, and all others who need dependable, up-to-date material in the machine-shop and metalworking field.

Revised 8th Edition

Gives 1537 pages of most dependable data on all branches of machine-shop and drafting-room practice; over 2500 illustrations, diagrams, and tables; in one handy volume, 4½ x 7, $7.00.

Gives you the benefit of many time and material saving shortcuts developed in actual shop work.

AMERICAN MACHINISTS' HANDBOOK

By FRED H. COLVIN
Editor Emeritus, *American Machinist*
and FRANK A. STANLEY
Formerly Editor, *Western Machinery and Steel World*

Which section will you use most?

The following is only a list of main section headings. The big 12-page index makes easily accessible the hundreds of more detailed topics—accurate, dependable facts, figures and methods in all of these sections.

1. Screw Threads
2. Pipe and Pipe Threads
3. Drilling
4. Reamers and Reaming
5. Taps and Tapping
6. Files and Work Benches
7. Babbitting, Brazing, Soldering and Welding
8. Gearing
9. Turning and Boring
10. Milling Machine Feeds and Speeds
11. Grinding, Honing and Lapping
12. Screw Machine Tools, Speeds
13. Punch Press Tools
14. Broaches and Broaching
15. Bolts, Nuts and Screws
16. Measuring and Fitting
17. Tapers and Dovetails
18. Shop and Drawing Room Standards
19. Wire Gages and Stock Weights
20. Horse-power, Belts and Shafting
21. Metals and Other Materials
22. Machine Forgings
23. Knots and Slings
24. General Reference Tables
25. Automotive Data
26. Railroad Shop Data
27. Shop Trigonometry
28. Dictionary of Shop Terms

JUST where can any worker find as much and so wide a variety of helpful material as is given in this well-planned and well-organized handbook? Just think of being able to find the answer—the *right* answer—to any question—*quickly*—layouts, speeds, feeds, tools, jigs, fixtures, materials, standards, tolerances—any detail of machine-shop or drafting-room practice. In one handy, compact volume this Handbook fills all your reference needs.

Helps you with other men's experience

It is impossible to more than suggest the scope of this book. The whole shop field has been combed for the best, most useful information on the problems that arise in every type of shop or plant, whatever its size, whatever its special problems. A great deal of the material comprises data and methods being used and improved by leading manufacturers. Here are facts and figures on many different materials, practices and processes, effective substitute uses, pointers on machining special metals, and methods for difficult operations in drilling, grinding, punching, etc.—hundreds of kinks and shortcuts you can readily adapt to your machine-shop work.

Look up in this edition:

- **data on wire measurement of screw threads — specifications for wires for satisfactory fits in mass production**
- **38 pages of material on screw threads, with many revised tables for American Standard threads—data direct from the Bureau of Standards in Washington**
- **standards for truncated Whitworth threads**
- **valuable material on best methods in cutting and forming aircraft sheet-metal work**
- **extensive section on milling practice, with research data from leading makers of milling machines and cutters**

Send this coupon today!

Can you use information like this?

This is only a small selection of topics, chosen at random, to illustrate something of the type and scope of information in the Handbook

—wire method of measuring pitch diameter of taper pipe threads
—data on bevel gear systems from the Gleason Works
—speeds and feeds for tungsten-carbide tools
—information on highspeed or hyper-milling
—data on negative rake angles for cutting steel, with details on care of cutters
—calculation for circular form tools
—thread lobes for screw-machine cams
—the Guerin process for cutting and forming sheet metals
—suggested cutter angles for turret lathe work
—adaptation of older machines to use of carbide tooling
—plastics used in forming dies
—procedure in atomic hydrogen welding
—advantages of glass gages
—recommended substitute steels for materials containing nickel, chromium, and vanadium
—use of the Aero screw-thread system
—properties given to steel by alloying elements

McGRAW-HILL ON-APPROVAL COUPON

McGRAW-HILL BOOK CO.
330 W. 42nd Street, New York 18

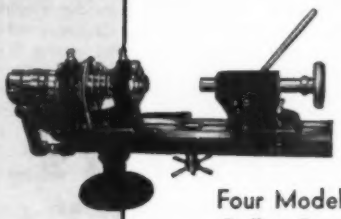
Send me Colvin and Stanley's **AMERICAN MACHINISTS' HANDBOOK**, 8th Ed., for 10 days' examination, on approval. In 10 days I will send $7.00 plus few cents for delivery, or return book. (We pay for delivery if you remit with this coupon; same return privilege.)

Name .....
Address .....
City ..... Zone ..... State .....
Company .....
Position F-AM-49

Books sent on approval in U.S. and Canada only.

LATHES
MICROMILLS
ATTACHMENTS
COLLETS

DERBYSHIRE
Fine Precision Instrument LATHES



Four Models
Collet Capacity
.196" to .315"

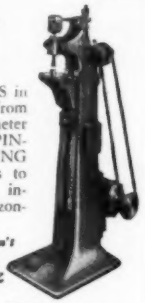
F. W. DERBYSHIRE, INC.
Waltham 54, Massachusetts

GRANT

RIVETERS — PIONEERS in their line—head rivets from smallest to 5/8" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—Sizes to meet all needs—Types include Vertical and Horizontal Multiple Spindles.

Write for literature and don't forget to send samples.

THE GRANT MFG. & MACHINE CO.
85 Silliman Ave., Bridgeport, Conn., U. S. A.



STRAIGHT SIDE SINGLE CRANK PRESSES
for heavy blanking and forming

Heavier classes of blanking and forming work can be handled efficiently and economically on these presses.

Sturdily constructed with either solid frame or built up with tie rods. Small elastic deflections do not affect tool alignment. All stresses taken centrally. Made also with wedge adjustment for slide for very close work.

Full details on request.

ZEH & HAHNEMANN CO.
180 Vanderpool Street
NEWARK N. J.

Straight Side Press

BAUMBACH *The* DIE SET AUTHORITY

All Baumbach Die Sets have demountable Loader Pins and Bushings. This exclusive feature permits removing Loader pins for machine work on the die shoe and assures reassembly without loss of alignment. A big time and trouble saver. Write for Catalog.

E. A. BAUMBACH MFG. CO., 1804 S. Kilbourn Ave., Chicago 23, Ill.

PRESSES • FEEDS
AUTOMATIC EQUIPMENT
The VEO Press Company
HUDSON, NEW YORK

FORGINGS and STAMPINGS

DIXISTEEL forgings and stampings are made of carefully analyzed steel produced in our own open hearth furnaces. They are of highest quality and strength.

Send us your prints or specifications for forged or stamped parts, and we will be pleased to submit our estimate for production.

ATLANTIC STEEL COMPANY
P. O. BOX 1714 DIXISTEEL ATLANTA 1, GEORGIA

STANDARD PRACTICE ...

FOR STENCIL MARKING SHIPMENTS
Users save $50 a month with Marsh Stencil Machines, Brushes, Inks. Electric and Hand Operated machines cut 1/2", 3/4", 1" letters. For sample stencil, Shippers' Handbook, prices, pin this to business letterhead with your name.

MARSH STENCIL MACHINE CO.
40 Marsh Bldg. • Belleville Ill., U. S. A.

ACROMARK

HERCULES HOLDERS
AND "SHOULDER STYLE" STEEL TYPE ARE FURNISHED IN HAND OR PRESS STYLES FOR FAST "ON-THE-JOB" NUMBERING

MAKERS OF MARKING & NUMBERING MACHINES, STEEL STAMPS & DIES

SEND FOR LATEST COLOR FOLDER AND PRICE LIST OR SEND A SAMPLE OF YOUR PRODUCT FOR OUR MARKING RECOMMENDATION—FREE

The ACROMARK Company

7-13 MORRELL ST.
ELIZABETH 4, N. J.

CONTRACT WORK

KAMIS
ENGINEERING COMPANY
DESIGNERS & MANUFACTURERS of TOOLS and MACHINERY

We have open capacity for machine work on the following facilities:

36" to 54" Vertical Boring Mills
3" to 5" Horizontal Boring Mills
#2 to #5 Vertical and Horizontal Millers
10" to 50" Engine Lathes

SEND FOR BROCHURE #4 WHICH DESCRIBES OUR FACILITIES IN DETAIL.

THIRD & MOORE STREETS
PHILADELPHIA 48, PA.

PATTERNS in WOOD and METAL
For All Kinds of Castings, Large or Small
MATCH PLATE WORK A SPECIALTY
Put your pattern problems up to us – we will take care of them.
GENERAL PATTERN WORKS
2223 Bush Street Cincinnati, Ohio

PRECISION PARTS
Manufacturers of Reamers, Metal Cutting Tools, and Special Machinery.
Facilities available for the production of small and medium precision parts.
Send blueprints for free estimate
DENNISON MACHINE TOOL CO., INC.
BOX 2251, HICKORY, N. C.

Put Your Idle Capacity to Work
Hundreds of metal-working companies are finding profitable business today outside their regular lines. Tell metal-working America—the 100,000 readers of American Machinist—about your facilities. Write for rates.
CONTRACT WORK DEPARTMENT
AMERICAN MACHINIST
330 W. 42nd St., N. Y. 18, N. Y.

WANTED

WE WANT TO BUY
One—Cincinnati Plain Hydromatic Miller 56-90 or 56-96
Several—Greenlee 1⅝" Bar 6-sp. Automatics
Three—J&L #3 Ram Type Univ. Turret Lathes
One—Bullard 42" or 54" Vert. Turret Lathe
All machines must be 1939 or later.
Send detailed offers to
WELLINGTON INDUSTRIAL CORP.
790 Broad St., Newark, N. J.

SEARCHLIGHT SECTION

(Classified Advertising)

EMPLOYMENT : "OPPORTUNITIES" : EQUIPMENT
BUSINESS : : USED OR RESALE

RATES

UNDISPLAYED

90c per line, minimum 4 lines. To figure advance payment count 5 average words as a line.

Individual Employment wanted advertising ½ the above rate payable in advance.

Box Numbers—Care of publication New York, Chicago or San Francisco offices counts as 1 line.

Discount of 10% if full payment is made in advance for 4 consecutive insertions.

DISPLAYED

Individual Spaces with border rules for prominent display and advertisements.

The advertising rate is $9.00 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

An advertising inch is measured ⅞" vertically on a column—3 columns—30 inches to a page.

REPLIES (Box No.):
Address to office nearest you
NEW YORK: 330 W. 42nd St. (18)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITIONS VACANT

WANTED—HIGH type Designing Engineer on High Pressure Hydraulics. Give educational background as well as references. P-9084, American Machinist.

PRODUCTION SUPERINTENDENT wanted. Large, well established manufacturer of heavy machinery, located in Rocky Mountain area, has exceptional opening for high calibre man with successful record of supervision of modern machine shop and assembly department. Man selected will be thoroughly conversant with latest practices in tunnel lathe, engine lathe, grinding and boring mill operation. Familiarity with production control and costing methods desirable. Apply by letter giving all particulars regarding age, experience (in detail); number of employees under supervision, references and salary expected. If possible, enclose recent photo. All applications will be kept in strict confidence. Write P-9079, American Machinist.

SELLING OPPORTUNITIES OFFERED

REPRESENTATIVES WANTED throughout the U.S. by manufacturers of standard line of carbide and steel cylindrical gages. Good opportunity for commission salesmen with allied lines. Exclusive basis. RW-9020, American Machinist.

WANTED—SPECIAL Machinery Salesman. Top proposition to men traveling out of town industries. Mechanical Machine & Tool Wks., Chicago 22, Ill.

EMPLOYMENT SERVICE

SALARIED POSITIONS $3,500-$35,000. If you are considering a new connection communicate with the undersigned. We offer the original personal employment service. 39 years recognized standing and reputation. The procedure of highest ethical standards is individualized to your personal requirements and develops overtures without initiative on your part. Your identity covered and present position protected. Send only name and address for details. R. W. Bixby Inc., 266 Dun Bldg., Buffalo 2, N. Y.

POSITIONS WANTED

ENGINEER: AGE 38, aluminum, zinc die cast dies, tools and product, 18 years experience of design, shop and production. Desires responsible position. PW-8727, American Machinist.

METALWORKING ENGINEER, experienced in all types of metalworking processes and reduction of costs. 14 years in development, shop operation and management. M.E. and M.S. degrees from leading colleges. Highly trained in the tools of modern management. Now employed but available soon. Your opportunity to engage an unusual engineer as a project engineer or assistant works manager. PW-8657, American Machinist.

SELLING OPPORTUNITIES WANTED

AGGRESSIVE SALES Engineering organization covering Michigan are interested in representing reputable manufacturers contacting the automotive production and working industries. RA-9043, American Machinist.

AGGRESSIVE SALES Engineering organization covering Michigan are interested in representing reputable manufacturers contacting the automotive production and metal working industries. RA-9036, American Machinist.

PATENT ATTORNEY

Patent Practice

before U.S. Patent Office, Validity and infringement investigations and opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine and Rommel, Registered Patent Attorneys, Suite 453, 815-15th Street, N. W. Washington 5, D. C.

WANTED

ANYTHING within reason that is wanted in the field served by American Machinist can be quickly located through bringing it to the attention of thousands of men whose interest is assured because this is the business paper they read.

Are You Seeking or Offering
— business
— equipment
— employment
"OPPORTUNITIES"?

To fill any of these "industry wants" a logical source is found in this Searchlight Section—Classified Advertising.

Experience has shown that the Searchlight Section produces quick results because it spotlights current opportunities of special interest to the readers of AMERICAN MACHINIST—management and production executives in the metalworking industry.

Use "Searchlight"—at low cost—to feature your wants or offerings . . . whether it concerns employment, buying or selling used or surplus new equipment, or other pertinent business "opportunities."

YOUNG AGGRESSIVE SALES ENGINEER WANTED

- The Wilcolator Company, manufacturer of thermostats, is interested in acquiring the services of a young, aggressive sales engineer to complement our present representative in the rapidly sales-growing area of Chicago and vicinity.
- Please address all replies to

THE WILCOLATOR COMPANY
1001 Newark Ave., Elizabeth, N. J.
Department AM

- Kindly include complete information, all of which will be treated in confidence.

EASTERN REBUILT MACHINE TOOLS FOR IMMEDIATE SHIPMENT FROM STOCK

ENGINE LATHES

10x20" centers Monarch EE Geared Head, m.d., latest
10x24" Logan, cone, motorized
12x30" centers American Geared Head, m.d., late
13x30" centers Pratt & Whitney Model E, m.d., taper
13x48" centers Pratt & Whitney Model D, m.d.
14x30" centers Lodge & Shipley Selec. Head, m.d., latest
14"x6' American Geared Head, m.d.
14"x6' bed Hendey Geared Head, m.d., taper
14"x6' Lodge & Shipley Geared Head, m.d.
14"x6' Pratt & Whitney, cone
14"x6' LeBlond, cone
14"x6' Sidney Geared Head, m.d.
14"x6' Springfield Geared Head, m.d., taper
14"x8' Prentice, m.d., taper
14"x8' Pratt & Whitney, cone
15"x6' LeBlond Geared Head, m.d.
16"x36" Pratt & Whitney Geared Head, m.d.
16"x6' Bradford, cone
16"x6' Hendey Geared Head, m.d.
16"x6' Hendey Yoke Head, taper
16"x6' Lodge & Shipley Selec. Head, m.d.
16"x6' bed Monarch Geared Head, m.d.
16"x10' Hendey Yoke Head, taper
16"x14' American Geared Head, m.d.
17"x6' LeBlond Geared Head, m.d.
18"x52" centers American Geared Head, m.d., taper
18"x5' LeBlond Geared Head, m.d.
18"x6' bed Lodge & Shipley, cone, motorized
18"x6' Monarch Geared Head, m.d.
18"x7' Hendey Geared Head, m.d., taper
18"x8' American Geared Head, m.d.
18"x8' Champion, cone
18"x8' Hendey Geared Head, m.d.
18"x8' Lodge & Shipley Selec. Head, m.d.
18"x8' Lodge & Shipley, cone
18"x8' Whitcomb-Blaisdell, Geared Head
18"x10' Cincinnati, cone
18"x10' Lodge & Shipley Selec. Head, m.d.
19"x8' bed LeBlond Geared Head, m.d., taper
19"x10' LeBlond Geared Head, m.d.
20"x8' American Geared Head, m.d., taper
20"x8' Cisco, cone
20"x10' Sidney Geared Head, m.d.
20"x11' Lehmann Geared Head, m.d., taper
21"x12' Bradford, cone
21"x18' LeBlond, cone
22"x70" centers Greaves Klusman Geared Head, m.d., taper
22"x8' Lodge & Shipley, cone
23"x12' LeBlond Geared Head, m.d., taper
24"x10' Hendey Geared Head, m.d.
24"x10' American, cone
24"x10' Greaves-Klusman Geared Head, m.d., taper
24"x10' Lodge & Shipley, cone
24"x12' Bridgeford Geared Head, m.d., taper
24"x12' LeBlond, cone
24"x12' Monarch Geared Head, m.d., taper
24"x40' bed American Geared Head, m.d.
25"x10' LeBlond, cone
26"x8' Bridgeford Geared Head, m.d.
26"x12' Bridgeford Geared Head, m.d., taper
27"x40" centers Monarch Geared Head, m.d.
27"x18' LeBlond Geared Head, m.d., p.r.t., hardened ways
30"x12'6" Niles-Bement-Pond, m.d., taper
30"x13'6" Niles-Bement-Pond, m.d.
30" raised to swing 36"x20' American Geared Head, m.d., taper, Timken
32"x12' Lehmann Hydratrol Geared Head, m.d., taper, latest
36"x36'6" Niles Heavy Duty, m.d., latest, 2 carriages
50"x20'" centers LeBlond Geared Head, m.d., taper, latest

MANUFACTURING TYPE MILLING MACHINES

No. 00 Sundstrand Hydraulic Rigidmill, m.d., latest
No. 0-8 Cincinnati Model EA, m.d., latest
No. 12 Brown & Sharpe, m.d.
No. 1-12 Cincinnati, m.d., latest
No. 1-18 Cincinnati, m.d., latest
No. 2 Sundstrand Electromill, m.d., latest
No. 2-18 Cincinnati, m.d., latest
No. 2-18 Cincinnati, m.d., with rise & fall, latest
No. 2-24 Cincinnati, m.d., latest
No. 4-48 Cincinnati Plain Hydromatic, m.d., latest
No. 4-48 Cincinnati Duplex Hydromatic, m.d., latest
No. 34-36 Cincinnati Duplex Hydromatic, with tracer control, latest
No. 56-72 Cincinnati Duplex Hydromatic, m.d., latest
No. 56-90 Cincinnati Duplex Hydromatic, m.d., latest
Type P Ohio Mfg., m.d.
Sundstrand Rigidmill, m.d.
4" Pratt & Whitney Splines, m.d.
No. 33 Kempsmith Mfg., s.p.d.
18", 24" Cincinnati Plain Automatic, m.d.
24", 48" Cincinnati Duplex Automatic, m.d.
30"x36"x12' Ingersoll Slab, 2 heads, m.d.
72"x6' Ingersoll Single Horizontal Spindle Traveling Housing Milling Machine, m.d.

THREAD MILLING MACHINES

No. CT-36 Lees-Bradner, m.d., latest
No. CT-54 Lees-Bradner, m.d., latest
Hall Planetary, m.d.
4½x12", 6x14", 6x48", 6x20", 6x60" Pratt & Whitney
10x24" Hanson Whitney, m.d., latest

PLAIN MILLING MACHINES

No. 000 Brown & Sharpe, m.d., latest
No. 1A Milwaukee, m.d.
No. 1M Cincinnati, m.d.
No. 1½, 2, 3 Cincinnati, cone
No. 2 Cincinnati H.S. Dial, m.d., latest
No. 2B Brown & Sharpe, m.d., latest
No. 2 Rockford, m.d.
No. 2HL Milwaukee, m.d., latest
No. 2MH Cincinnati, m.d., latest
No. 3B Brown & Sharpe, m.d., late
No. 3 Cincinnati, cone
No. 3, 4 Kempsmith Plain Maxi-Miller, m.d.
No. 3B Milwaukee, m.d.
No. 3 Van Norman Duplex, s.p.d.
No. 4 Cincinnati H.P., m.d
No. 4 Ohio, cone
No. 5 Cincinnati, rect. ove'arm, m.d.
No. 5 H.D. LeBlond, s.p.d.
No. 5B Heavy Brown & Sharpe, m.d
No. 25 Becker, cone

UNIVERSAL MILLING MACHINES

No. 2 Cincinnati, cone
No. 2A Brown & Sharpe, s.p.d.
No. 2 Cincinnati Medium Speed Dist, m.d., latest
No. 2M Cincinnati, m.d.
No. 2 Kempsmith, cone
No. 3 Brown & Sharpe, cone, motorized
No. 3 Kempsmith, cone
No. 4A Brown & Sharpe, m.d.
No. 4 Cincinnati H.P., m.d.
No. 4 H.G. LeBlond, s.p.d.

VERTICAL MILLING MACHINES

No. 0B Cincinnati, m.d., latest
No. 2M Cincinnati, m.d.
No. 2, 3, 4 Cincinnati H.P., m.d.

We carry an average stock of 2,000 machines in our 11 acre plant at Cincinnati. Let us quote on your requirements.

THE EASTERN MACHINERY COMPANY
1004 Tennessee Avenue, Cincinnati 29, Ohio — MElrose 1241 — CABLE ADDRESS EMCO

UNUSUAL VALUES

Milling Machines—No. 1, Universal, No. 1 American (new) plain, No. 1 Vertical.

Drills—Large selection, single and multiple spindles also bench types, many of them new.

Gear Cutters—Brown & Sharpe No. 3—26" Gould & Eberhardt 48".

Grinders—Cylindrical B & S No. 11, Planer type 16"x36" Surface 12"x63", also new (small) Universal bench and floor type. All with coolant, motorized.

Lathes—14"x6', 8', 10'—10"x6', 8', 10'—18"x8', 8', 10'—20"x10'—all cone drive, several motorized also (new) 18"x8' and 10' geared head, motorized.
Large stock 19" and 18" bench and floor type.

Planers—Single head 24"x6', 24"x8', 26"x8'.

Shapers—16", 20", 24", B.G. crank.

Turret Lathes—J & L 2"x24"—2"x36" also Acme, W & S Turret (vertical) boring and facing mills, 5 hole turrets, 30", 40".

SPECIAL—New totally enclosed dust proof, fan cooled, ball bearing saw arbor motors, plain shafts to size or threaded, and with collars, measures only 3¼" from center of shaft to flatted top (1 h.p. to 15 h.p.) 2 or 3 phase, 3600 r.p.m.

WOOD WORKING MACHINERY—A very large stock of new and re-built, practically all motorized. New Motorized overhead cut-off and miter saw for wood, plastics, steel, aluminum and other metals. The above list is only a fraction of our stock which changes almost daily, therefore, tell us definitely what you want since we are adding considerable number of machines to our stock which are too many to list. What we have today may be sold tomorrow, so a list is really not dependable.

Drill—Foote-Burt No. 25 24" III Duty 2" capacity in steel. Motor attached.

PATTERN MAKING MACHINERY—42"x16' bed wood lathe, compound rest, rack and pinion feed to carriage; 16" heavy duty jointer, extra long bed, front table tilts for giving draft to pattern work; tilting table also tilting arbor rip and cut-off saws; band saws; jointer; floor and bench type trimmers; and also many other machines for pattern work.

THE OSBORNE & SEXTON MACHINERY CO.
P. O. Box 88, Columbus 16, Ohio

VICTOR'S BARGAINS

NEW *SURPLUS*

SLOCOMB MICROMETERS

0-1"	$5.00
1-2"	6.00
2-3"	7.00
3-4"	7.50
4-5"	7.50
5-6"	7.50

UNION SCALES

6" Scales, #4 Union, ¾" Wide, Hardened, 8ths, 16ths, 32nds, 64ths, $.40 each, $4.00 per dozen.

VICTOR MACHINERY EXCHANGE INC.
251 CENTRE ST.
NEW YORK 13, N. Y.
CANAL 6-5575

ALL PRICES DRASTICALLY REDUCED!!

All Late Type

#72A3 HEALD Garomatic, Internal Grinder, Serial #1558—$1900.00
#16A BRYANT Internal Grinder, Serial #P6041—$1900.00
1" RAL Acme Gridley's, 23,000 Serial $3500.00 ea.
18½" swing MONARCH Lathe, Serial #17216—$4600.00
14x36" BROWN & SHARPE Univ. Grinder, Serial #2682—$3600.00
#12 BROWN & SHARPE Production Mills, 48½" x12" tables Serial #'s 2540—$2100.00 ea.
5 Ton SHEPARD & NILES Crane, 27' Span, cheap!

All above with A. C. motors.

HAND BRAKES

IMMEDIATE DELIVERY, BRAND NEW

10' 16 ga. $440.00
6' 16 ga. 249.00
4' 16 ga. 185.00

All steel construction. Sizes available from 4'. Prices f.o.b. factory.

2000 Ton BLISS HYDRAULIC, 3 column type 12" stroke, 116" dia. bed, 1942 model, for sale, less than ½ cost.

#705 BLISS PRESS, 12" stroke 1941—$3650.00

25% OFF LIST PRICE

SPOT WELDERS, air operated or foot operated, brand new, fully guaranteed nationally known manufacturer. Example: Present factory price $281.00 for 3 KVA, our special price $217.00.

Butt Welders, 100 KVA, late type $500.00

MONA MEMBER

PAULS MACHINERY COMPANY
6111 Vermont Ave. — Detroit 8, Mich.
Phone TYLER 7-6300

PRACTICALLY NEW

Type "T" Barber Colman Hobbing Machine. Complete with all gears, tangential feed. Serial No. 125
Excellent Mechanical Condition
PRICE $6,750.00

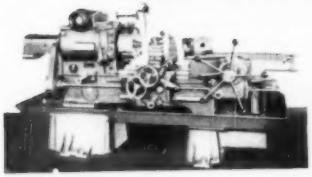
WINSTON MACHINERY CO., INC.
517 S. Delaware St., Indianapolis 4, Ind.

BUY FROM STOCK
Telephone
HAMILTON 8744-45

FALK
MACHINERY COMPANY

18 WARD ST.
ROCHESTER 5
N. Y.

Every Item Guaranteed as Represented



Gisholt #4 Universal Grd. Head Ram Type Bar Feed Turret Lathe. 2" Capacity. 12 speed hd. Hydraulic Speed Selector. Has tooling & coolant system.

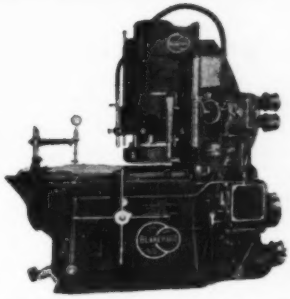
TURRET LATHES

Bardons & Oliver #1 Electric Turret Lathe. ¾" cap. Has bar feed & collets.
Morey #2 Geared Head 1" Cap., M. Dr.
Simmons Microspeed 1" Cap., M. Dr.
Oster #601 Hand Screw Machine 1½" cap.
W-Swasey #4 Univ. 1½" cap., M. Dr.
Jones & Lamson #3 Univ. Bar Feed 1½"
W-Swasey #3 Univ. 1½" cap., M. Dr.
Bardons & Oliver #7, Univ. 2½" Cap.
W-Swasey #3A Univ. 3½" cap., M. Dr.
Warner Swasey #1A Universal Heavy Duty Saddle Type Turret Lathe. Serial #648220. Capacity—2½" rd. Grd Hd. 12 speeds. Coolant system, bar feed, chuck & Tooling. Immediate delivery. Excellent condition.

Dreis & Krump #458D Motor Driven Power Press Brake. Serial #5439. 7½ h.p. 3/60/220/440 volts motor. Also ram motor. Push button controls. Capacity—8'x¼" steel and lighter. Takes 8'6" between housings. Throat—8". Stroke—3". Die Space—12". 30 strokes per minute. Has Standard Die Holders, also Adjustable gauges.

ENGINE LATHES

LeBlond 36"x30' Q.C.G. Hvy. Duty Geared Head Screw Cutting Engine Lathe. Serial #NK-230. 12 Speed Head. 36" internal grd. faceplate, Taper Attachment, Dail Thrdg. Set of toolholders. Max. Swing—39". Centers—22'6". 25 h.p. 3/60/220/440 volts V-belt drive.
24"x 16' American Q.C.G. Motorized Cone Head. 11' centers. Taper Attachment, 24" chuck, faceplates, cabinet type legs. 220/440 volts motor & controls.
24"x12' Putnam Motorized. On raising blocks to swing 32" with 66" c.c.
20"x11' Schumacher-Boye, Q.C.G.
20"x10' American, Q.C.G. 72" centers
20"x10' Hendey Motorized.
20"x8' Lodge & Shipley, Q.C.G. M. Dr.
18"x8' Davis O.C.G. 42" centers, equipment
18"x8' Lodge & Shipley, geared head
18"x8 Hendey Q.C.G. 49" centers
18"x6' American, Geared Head, M.D.
16"x12' South Bend Q.C.G. Enclosed Head Underdriven with 1½ h.p. motor & controls. 105½" centers. NEW—1946. Has chuck, turret tool post, 2-steady rests, faceplates. Excellent condition. Immediate delivery from stock.
16"x8' Hendey Q.C.G. M. Dr.
16"x6' Lodge & Shipley Geared Head
16"x6' Lodge & Shipley "Patent Head", Motor Dr.
16"x6' South Bend Enclosed Head, Motor driven. Taper Attachment, Chucks, Collets & Quick Acting Collet Chuck.
14½"x6' South Bend Enclosed Head, Motor Driven. Taper Attachment, chucks, Turret Toolpost Threading Dial, Ram Type Turret Attachment, collets & Collet Chuck.
14"x8' Reed-Prentice Eight Speed Selective Geared Head, Q.C.G. Motor driven w/220/440 volts motor & controls. Has Taper Att. chuck, faceplates, steady rest, cabinet legs, max. centers —48". Completely rebuilt. Immediate shipment.



Blanchard #16 Motor Driven Vertical Rotary Surface Grinder. 26" Chuck with power down feed to head. Built-in coolant system.

GRINDING MACHINES

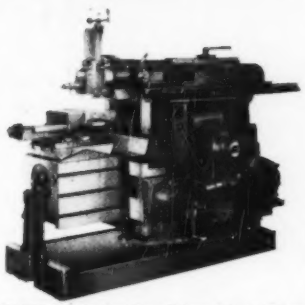
Cincinnati 10"x36" Plain Hydraulic Cylindrical Model #EA. Serial #5P2D1L-19. Filmatic Bearings. Built-in Electrics. Hydraulic Infeed.
Cincinnati "Monoset" Model #0E Cutter & Tool Grinder. Motor driven. With motors & controls. Set of collets, taper & cylindrical and equipment.
Heald #22 & #25, 12" & 16" Horizontal Rotary Surface Grinders. Motor driven.
Thompson 6x18 Hydraulic Horiz. Surface. Wet & dry work. 220/440 motor driven. Auto. downfeed to head. Motor driven exhauster unit.
Norton 6x36 Horiz. Surface. 220/440 volts motor. Has extra grinding wheels and 40x9 chuck. For wet & dry work. Excellent condition.
Norton 6x18 Vertical Rotary Automatic Surface Grinders. 220/440 volts motors. Excello Spindles. Hydraulic Table feeds. Three Available with immediate delivery. Also 6x18 Horizontal.

AUTOMATICS

#0G & #00 Brown & Sharpe Automatic.
#2G Brown & Sharpe High Speed Automatic Screw Machine. Serial #6814. Self-contained 5 h.p. 3/60/220/440 volts motor drive & controls. Complete coolant, toolposts, gears, collets. FOUR AVAILABLE.
#2 Brown & Sharpe Automatic. Turner drive 220/440 volts motor. With Stock stands, collet, toolposts, coolant system, change gears. FOUR AVAILABLE.
Cleveland Model "A" 3¼" capacity Single Spindle Motor Driven Automatic. Has lot of tooling, collets, motors and switches & coolant system.

PUNCH PRESSES

O.B.I. Johnson (NEW) all sizes, geared & plain
O.B.I. Federal #3, 26 tons cap. motor dr.
O.B.I. Toledo #5, 44 tons cap. motor dr.
O.B.I. Bliss #18, 19C, 20, 20B, 21 motorized
O.B.I. Michigan, 36 tons cap. Wide ram & bed
Geared S.S.S.A. Bliss #305 Motor driven
Wheel Press, Niles, B & Pond Horiz. Hydraulic. 200 tons cap. 48" between strain bars
Stamping, Ferracute #86 Wide Frame, 61½" between housings. 13¾" stroke. Motor driven
Backflywheel, Ferracute #P4, 50 tons cap. 15"x 24" bed, 2" stroke. 220/440 direct gear motor drive w/controls.
Transfer, Nilson 56 tons S.S. Dble. Crank 3-Die.



GEMCO 20" Standard Duty Universal Motor Driven Shaper. (NEW) Power Rapid Traverse horizontal & vertical. 8 Cutting Speeds, 18 cross feeds. 5 h.p. 3/60/220/440 volts V-belt drive. With 12" Vise & set of wrenches. Immediate delivery.

SHAPERS

Shaper—Columbia 32" B.G. Crank, motorized Power downfeed to head.
Shaper—Logan 7" Horizontal. NEW
Shaper—Machinery Sales 16", motorized
Shaper—Smith & Mills 16", motorized
Shaper—Smith & Mills 16" Universal
Shaper—Gould & Eberhardt 16", motorized
Shaper—Gould & Eberhardt 18" B.G. Crank
Shaper—American 24" crank, motorized

MILLING MACHINES

Nichols Hand, Late Type, M.D. (six)
Hardinge B.B. Vertical, Bench
Becker #5C Vertical, Cone Dr.
Cincinnati #3, #4, #5 Pl. Horiz.
Brown & Sharpe #12 Production. 18" Autom.
Brown & Sharpe #12 Production. 24" Autom.
Brown & Sharpe #0, 1, 1Y Horizontal
Kempsmith #1, #2 Plain Horiz.
Cincinnati 18" Mfg. Plain
Milwaukee #2K Vertical, M. Dr. Dial Type
Milwaukee #3K Vertical, M. Dr. Dial Type
Milwaukee #1½ Dbl. Overarm, Horiz.
Milwaukee #2B Dbl. Overarm, Horiz.
Milwaukee #3B Plain Horizontal
Pratt & Whitney #2 Duplex, Motorized
#3 Dial Type, H.S. Cincinnati Vertical Mill. Power Rapid Traverse, speeds up to 1300 r.p.m. Range—34"x16"x16" Head has 6" vertical with four stop indicator. Serial #4A3V1L-61. Timken Bearing. 10 h.p. motor drive in base. Two available.

UNIVERSAL MILLING MACHINES

Ames Bench, 12" x 3" x 7½" W/Index Hd.
Index #40H, 16"x8¼"x16"
B & S #2, 20"x5"x17½"
B & S #1½", 20"x7"x18"
Bridgeport, 20' x 9' x 16" Turret Type.
B & S #10, 24"x8"x15"
Garvin #2MU, 24"x8"x18"
K & T "Milwaukee" #2, 28"x10"x17"
Kempsmith #2, 28"x8¼"x18"
Cincinnati #2, 28"x10"x18"
Cincinnati #2M, 28"x10"x18"
B & S #3, 34"x10"x21"
Cincinnati #3S, 34"x12"x20"
Some w/index heads & equipment

DRILLING MACHINES

American 4' Arm, 11" Col. Motor on Arm Radial. #5 M.T. has M. Dr. Coolant system.
Cinci-Bickford 6' Arm, 15" col. Radial
Cinci-Bickford 5' Arm, 13" col. Radial
Fosdick 5" Arm 14" col. Radial 5'
Cinci-Bickford 3' Arm, 9" Col. Radial. Motor driven. W/table. 12 Speed gearbox.

MAKE YOUR SAVINGS Here!

LATHES

Pratt & Whitney 16x38" Centers, model-B, 16-speed, Gr. Hd. 14 to 578-RPM.

Prentice 16"x54" centers, model-B Toolroom, 16-speed, Gr. Hd., (1942) 16 to 476-RPM, 18½" swt. Swing, taper attachment.

Bridgeford 36"x56', 15-speed Gr. Hd., 3.05 to 150-RPM, 38" Swt. swing, 48' C. Dist. Rebuilt 1943—taper Attchmt.—mtsd, carriage.

Bridgeford 30"x14', 9-speed Gr. Hd., 7 to 108-RPM—38½" swt. Swing—44' C. Dist.

Monarch 18"x11', 16-speed Timken Brg., Helical Gr. Hd.—13 to 550-RPM—100" C. Dist.

Niles-Bement-Pond 48"x24' Gr. Hd. Semi-Qck. Change Gear—variable speeds 2.53 to 103-RPM —52" swt. swing—15' C. Dist.—D.C. M.D.—Mtsd. carriage.

TURRET LATHES

Bardons & Oliver #3, 12-speed Ram Type Univ. —100 to 1525 RPM—1⅞" hole—19" turning length—15⅝" swing over ways—bar equip. and tooling.

2—Jones & Lamson #7A, 12-speed Saddle Type Univ., 20 to 1000 RPM—3" hole—21¼" swing—36½" turning length—chucking.

Jones & Lamson #8A, 12-speed Saddle Type Univ., 20 to 1000 RPM — 3½" hole — 21¼" swing — 36½" turning length—Bar & chucking.

UNIVERSAL MILLING MACHINES

Van Norman #28U Univ. Knee Type—wkg. surf. tbl. 50"x12"—25 to 1250-RPM—range 28"x10"x 17". (Very late) attachmts.

Brown & Sharpe #2, Light Type, Late Type—wkg. surf. tbl. 45"x10"—40 to 1260-RPM—range 28"x 10"x13"—vertical hd., attachmts (late).

Cincinnati #3B Rect. Over., motor-in-base—wkg. surf. tbl. 53½"x12" range 34"x12"x19"—18 to 500-RPM—vert. hd.—attachmts.

Cinn. #2M Constant Speed M.D.—wkg. surf. tbl. 52½"x10½"—20 to 410-RPM—range 28"x9"x15" —attachments.

Milwaukee #2 Standard Dbl. Over., motor-in-base —wkg. surf. tbl. 50"x12½"—15 to 354-RPM— range 28"x10"x17" heavy vert. hd. and attachmts.

PLAIN MILLERS (Late)

Cinn. #3 Dial Type Hi-Speed, wkg. tbl. 62½"x 15¼"—18 to 1300 RPM—range 34"x12"x20" (vert. attchmts.)

Brown & Sharpe #3 Dbl. Over. Standard, M.D. in base—wkg. table 55⅜"x14"—21 to 496-RPM —range 34"x12"x20".

Brown & Sharpe #2 Light type—wkg. tbl. 50½"x 10"—40 to 1300 RPM—range 28"x10"x15"— rapid traverse.

VERTICAL MILLERS

Cinn. #3 Dial Type Medium speed, wkg. tbl. 62½"x15¼"—18 to 450-RPM—range 34"x16"x16" (late).

Milw. (K & T) #3K Hi-Speed—wkg. tbl. 64"x 15½"—15 to 1500-RPM—range 34"x14"x16" (late).

Milw. (K & T) & 2K Hi-Speed—wkg. tbl. 56"x12" —15 to 1500 RPM—range 28"x12"x14" (late).

GRINDERS

Mattison 24"x18"x96" Hydraulic Hi-Power Precision —D.C. Generator—Mg. Chuck—Coolant—(used short while).

Thompson "BB" 12"x10"x24" Hydraulic Horiz.—Mag. Chuck—coolant—very late).

3—Norton 6"x18" Hydraulic & Hand Horizontal—Pope Spdls.—chucks—coolant (late).

Blanchard #11 Rotary Surface, 16" Chuck. (late)

UNIVERSAL GRINDERS (Late Type)

Cinn. 12"x24" and 12"x36" Univ. Hydraulic—Film. Brg. with attchmts.

B. & S. #13, 8"x24" Univ. & Tool, 2475 to 5730-RPM wheel speeds—attchmts.

BORING MILLS

Universal 4" bar "Triway" (late), added vert. range—speed 8 to 380-RPM—face plate to outer support 72"—top tbl. to centerline spdl. 48"—taper #6 Morse.

Universal #30 "Triway" 3"—Bar—face plate to outer support 80"—center spdl. to top tbl. 33¼" —11 to 440-RPM—taper #5 Morse.

Defiance #25A—3½" bar (late)—added vert. & cross range—speed 12 to 1000-RPM face plate to outer support top tbl. to centerline spdl. 48" —cross travel tbl. 72"—taper #6 Morse.

Defiance #5, 3" bar (1942)—long. tbl. travel 4'" —cross travel 40" — 15 to 531-RPM — taper #5 Morse.

Yoder #3A, 3" bar (late)—long. tbl. travel 52"— cross travel 30"—12 to 569-RPM—taper #5 Morse.

Bullard 36", "Spiral Drive" Vertical, 10 to 77 RPM tbl. speeds—face turret to tbl. 34", Side Head.

DRILLS (Radial)

Cinn.-Gilbert 4'11" column motor-in-base, 50 to 1800 RPM—taper #4 Morse—Dist. Spdl. to base 52½"—double base, (late).

Cinn.-Bickford 4'9" column "Super-Service" motor-on-arm—175 to 3500 RPM—Taper #4 Morse— Dist. Spdl. to base 55", (late).

Morris "More-Speed" 4'9" column Hi-Duty motor-on-arm—75 to 1500 RPM taper spdl. #4 Morse —Spdl. to base 53", (late).

Fontbart #3, 12" 6-spindle Power Feed Sensitive—taper #3 Morse—355 to 820-RPM—(2) motors each driving 3 spdls. (equal to new).

SHAPERS

Hendey 12" Univ. Hi-Speed Timk. Brg. (late)— 14 to 200 Strokes per min.—12¾" max. stroke.

G. & E. 24" M.D. Dbl. train gear Drive, "Invincible"—9 to 115 strokes per min.

This is only a partial listing — for complete information — write, wire or phone (WOrcester 6-5175)

Botwinik Brothers of Mass., Inc.

3 SHERMAN ST. WORCESTER 7, MASS.

FIFIELD ENGINE LATHE

81"x72" centers—quick change can be inspected under power. $4800.00

MITCHELL MACHINE

68 E. WARREN AVE., DETROIT 1, MICH.

LATE TYPE—FOR SALE

AUTOMATIC SCREW MACHINES

ACME GRIDLEY RA — 6 SPINDLES 1" CAP.
CONOMATIC, 8 SPINDLES, 2⅜" CAP.
14"x30" MONARCH GEARED HEAD LATHE

TRI-MACHINE & TOOL CO. INC.

248 LAFAYETTE ST. NEW YORK 12, N. Y.

FOR SALE

Metallizing gun and all accessories. Brand new equipment, never used, at less than half price. Reply

FS-9085, AMERICAN MACHINIST

330 W. 42nd St., New York 18, N. Y.

SHEET METAL MACHINERY

NEW and USED — HAND and POWER. Apron Brakes, Press Brakes, Shears, Formings Rolls, Power Presses, Pittsburgh Lock Machines, Spinning Lathes, Spot Welders, etc.

MONA MEMBER

B. D. BROOKS, INC.

381 Atlantic Ave., Boston 10, Mass.

LATE TYPE MACHINE TOOLS

AUTOMATICS

6" RPA—8 Acme Gridley Chucker. 1941.
16" Bullard Mult-Au-Matic. 1941.
1⅝" Greenlee, 6 spindle. 1942.
9/16" RA-6 Acme Gridley. 1942.

BORING MACHINES

No. 42 Lucas Horiz. Boring Mill. 1940.
No. 54 Excello Double End. 1940.
No. 49 Heald "Borematic". 1942.

BROACHES

No. CPC-30 Lapointe Vertical. 1941.
No. V-2 American Vertical. 1943.

DRILLS, HEAVY DUTY

25" Fosdick "Economax. 1941.
No. 121 Baker. 1941.
W-6 Baush Hyd. Multiple Spindle. 1943.

DRILLS, RADIAL

4'11" American Hole Wizard. 1943.
4'9" Cincinnati Bickford. 1944.
3'9" Cincinnati Bickford. 1946.

GEAR EQUIPMENT

No. 12B Gleason Gear Rougher. 1943.
3" Gleason Gear Generator. 1942.
No. 6 & 17 Gleason Gear Testers. 1943.
12" Red Ring Internal Shaver. Late.
No. GCL-3 Red Ring Gear Shaper. 1942
Vinco Spline & Gear Grinder. 1942.

GRINDERS, CYLINDRICAL

16"x36" Cincinnati Plain. 1942.
12"x48" Cincinnati Universal. 1943.
10"x72" Landis Type C Plain. 1942.

GRINDERS, INTERNAL

No. 74A Heald Extended Bridge. 1941.
No. 72A3 & A5 Heald Plain. 1944.
No. 16A22 Bryant Hole & Face. Late.

GRINDERS, SURFACE

14"x36" Pratt & Whitney Vertical. 1938
No. 22 & 25A Heald Rotary. 1943.
No. A1-8 Arter Rotary. 1942.

LATHES, ENGINE

42"x192" Axelson. 1942.
24"x168" Sidney. 1942.
18"x54" Lodge & Shipley. 1943.
14"x78" Reed Prentice. 1942.
14"x30" Lodge & Shipley. 1943.

LATHES, PRODUCTION

Gisholt "Simplimatic." 1943.
No. 3A Lodge & Shipley "Duomatic." 1943.
20"x25" Fay Automatic. 1942.
10"x22" Sundstrand, Models 10 & 12. 1942.
12"x18" Lipe "Carbo". Late.
14"x42" Monarch "Magna Matic". 1941
2FU Foster Fastermatic. 1943.

LATHES, TURRET

36" Bullard Vertical. 1946.
No. 2A & 3A Warner & Swasey. 1943.
No. 9A Jones & Lamson. 1942.
No. 3L Gisholt. 1941.
No. 2, 3, 4 & 5 Warner & Swasey. 1943.
8½"x24" Acme Universal. 1943.

MILLS, PLAIN

No. 5 Cincinnati High Power. 1943.
No. 4H & 4K Milwaukee. 1943.
No. 3 Van Norman Plain. 1942.
No. 2HL Milwaukee. 1942.

MILLS, PRODUCTION

No. BL-2420 P & W "Keller", 3 Sp. 1942.
No. BL-2416 P & W "Keller", 1 Sp. 1943.
No. BG-1 "Keller", single spindle.
No. 1848 Kearney & Trecker. 1942.
No. 1248 Milwaukee "Simplex". 1942.
No. 1-18 & 2-18 Cincinnati. 1942.

MILLS, THREAD

6"x60" Pratt & Whitney. Latest.
12"x54" Lees Bradner. 1942.
8"x16" Hanson-Whitney. Late.

MILLS, UNIVERSAL

No. 2L & 2MH Cincinnati. 1942.
No. 2H Milwaukee. 1942.
No. 26SU Van Norman. 1942

MILLS, VERTICAL

No 3H & 3K Milwaukee. 1942.
No. 2K Milwaukee. 1942.
No. 2 & 3 Cincinnati. 1941.

Send for Complete Stock List

INDIANAPOLIS MACHINERY & SUPPLY CO.

1961 S. Meridian St.
INDIANAPOLIS 6, IND.

Llate Type Machinery at Old Time Prices

AUTOMATICS

Brown & Sharpe #00G, H.S., #4, #6
Conomatic 8 sp. 1⅞" cap.
New Britain Gridley 5I—6 Sp. 2¼"

BORING MILLS

Bullard, 42" New Era V.T.L.
Giddings & Lewis #0, #25T
Lucas #31 horiz.
Universal 3" horiz.

DRILLS AND RADIALS

Amer. 4'-13" col. Radial.
Barnes #262, 20"
Canedy-Otto 3'-9" col.
Carlton 8'-19" col., Foote-Burt 6 Sp.
Cincl-Bickford Super Service, 21", 24"
Delta Bench & Floor Models single & 4 spindle
Natco Model E-5 Multi-Spindle, 14 spindles
Royersford Excelsior 21" Back Geared, P.F.
Sibley 24—28", Sliding Head, Allen 6 Sp.

ENGRAVERS

Gorton #3U, 3Z 2 dimensional; #3L, 3 dimensional
Gorton Cutter Grinders 375-2, 265-5 Preis U. E.

GEAR EQUIPMENT

Fellows #72, 725 High Speed
Nikron Gear Hobber
Michigan, Gleason Checkers

GRINDERS—Miscellaneous

Black Diamond #1 Drill
Brown & Sharpe #5 cyl., 3"x18"
Brown & Sharpe #1, #2, #3 Univ., #13 Univ. & Tool
Cincinnati #2 Centerless Filmatic, 12"x36, 12x48" Univ.
Covel #91A Univ. Tool & Cutter, Hammond #4 Carbide
Gardner #226, 30" disc, Heald #1 Tool
K.O. Lee Tool & Cutter
Landis #4H Cyl. 4x12", Landis #6 Thread, Centerless
Norton #2 Tool & Cutter
Norton Cyl. 6x18" Type C, 6x36" Type C
Oliver #510 Drill Pointer, Sellers #4G
Pratt & Whitney Radius #R6, Granby Int.
Porter Cable Belt WG6, G8

GRINDERS—Surface

Abrasive #1½" Wet Hand Feed, #34 Vertical
Atlantic 6x18" Power Feed, Foote-Burt Hammond
Blanchard #18—42" Chuck
Brown & Sharpe #2, #5 Hyd. 8x24" Cap.
G. & L. #18, 6x18" Hand Feed, #25, #35 Hyd.
Hanchett #300, 13x48"
Mattison 14x16x48 Hyd.
Norton 6x18" Hyd.
Pratt & Whitney 12x36" Vert.
Reid #2A P.F., #2C Pose & Excello Spdl.
Thompson Hyd. 6x10x18", 6x12x18

LATHES

Bradford 16"x6'
Hardinge Precision 9", cabinet
Hendey G.H. 16x30 Relieving Attach.
LeBlond Regal 19"x31½", 15x30", 19x48", 21x60"
LeBlond Heavy Duty 16x33"
Lodge & Shipley 18x78" T.A.
Monarch 10"x20" EE, 16x78" T.A., 12x30" CKK
Rivett Precision, Logan 10"x30"
South Bend 9"x3', 9"x3½', 13x36", 10" Cabinet
Sebastian 12"x4', G.H., Sheldon 11x24, 1" collet

LATHES—Turret

Acme #6W Bar & Chuck, 6W Fox Lathe
Bardons & Oliver #3, #5, Foster #3B
Brown & Sharpe #1, 2F Hand Screw Mach.
Gisholt #4, 5 Bar & Chuck, Second Operation
Hardinge ESM
Jones & Lamson #8A Univ. Saddle Type
Oster #60i Rapiduction, Morey #3, 1½" cap.
Warner & Swasey #3 Universal, #4 Pre-Selector, & #4A—6" Bar Cap. 1947

MILLS—Plain & Universal

Brown & Sharpe #2 Pl., #2A Univ.
Burke #4 Plain & Univ., Vert. Hds.
Cincinnati #3 Plain, 2MH Univ., Dial Type
Milwaukee #2HL, 2H, Plain H.S.D.T.
Milwaukee #2HL, 2H, 3H Univ. H.S.D.T.
Van Norman #12, 20, 22L, 36

MILLS—Vertical—JIG BORERS

Bridgeport vertical with Slotting Attach.
Brown & Sharpe #2, Index Vernon
Cincinnati #4 Dial Type, Jackson
Kearney & Trecker #5H, 3H High Speed
Gorton #8D, 9J Plain
Gorton #8½D Duplicator Fully Equipped
Fosdick Jig Borer #42 Like New 1947
P&W 1½B Jig Borer
Sip Jig Borer #MP-5
Moore Jig Grinder
Morey #12M Profiler 2 sp.—Pratt & Whitney 12B

MILLS—Production

Brown & Sharpe #000, 12, 21
Cincinnati #1-12, 1-18, 2-18 Mfg.
Kent Owens #1V
Nichols Hand, Vert. Hd., U.S. MM 1
Sundstrand #00 Rigidmills, U. S. Duplex

PRESSES

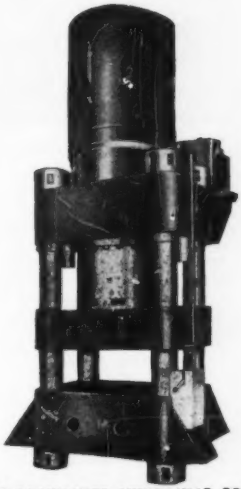
Bliss #8 Obl. Crank, Bed 42x100", 250 Ton
Bliss #675, 645B, 650 Hi-Production
Bliss #20, 21 O.B.I., #4½ Double Action Cam
Bliss #58 O.B. Gap Frame #62, 62A, 162
General Flexible Elec. Screw
Henry & Wright 25, 60, 75 Ton Dieing
Thomas 7A, 90 Ton O.B.I.
Toledo 400 Ton Knuckle Joint #063
V. & O. #25B O.B.I., #102 Reducing
Z & H 30 Ton O.B.I.

MISCELLANEOUS

BAND SAW: DoAll Metalmaster, Tannewitz #16M
BENDING ROLL: Buffalo #0, Excelsior #14
BROACH: 3L LaPointe Horiz. Hydr.
HACKSAW: Marvel #6A Automatic, #6, #4B
HAMMER: Niles Bement Pond 2500 lbs. steam
HAMMERS: Rochester Rivetting, Hi Speed, Grant
HONER: Micromatic #H-1 Hydrohoner, Sunnen
INJECTION MOLDER: Reed-Prentice #10D6, 6 ounce

NEW IN STOCK

Air Hydraulic Presses—Arbor Presses #6C Famco, ½ off list price—Band Saws Kalamazoo 8x16", 8x24"—Drill Presses all sizes—Grinder Surface, Abrasive #1½—Hydraulic Press Northern 20 Ton — Injection Molders, 1 ounce — Power Presses, Famco 4½, 7½ Ton, Rousselle O.B.I. & Horn 5, 10, 15, 25 Ton, Preserite OBI, 5, 10, 12, 18, 30 ton cap.—Shaper, 7" Ammco, 8" Shaprite, Sheldon 12"—Shears Foot 22" to 8', 16 & 18 ga., Shears, Power, 3'x18 gauge to 10 x 10 ga.—Welders, Arc, Seam, Spot all sizes—Vert. Milling Attach. Hales, HB 5 & 10 Speed—Motors, Grinders, Buffers, all sizes.



SELF-CONTAINED HYDRAULIC PRESS

HYDRAULIC EQUIPMENT

Cap.	Manufacturer	Platen	Stroke	Opening
500 Ton	Lake Erie	35x36"	36"	66"
600	Bald. S'thw'k	76x59"	22"	39"
500 D.A.	H.P.M. (100 Cushion)	36x36"	24"	30"
1000	French Oil	53x42"	20"	50"
300	Brand New Watson Stillman Hobbing Press			
375 D A	Elmes (60 Cushion)	84x44"	12"	42"
350	Verson	40x40	36"	72"
50	Dennison	22x20	18	23
150	Southwark	34x30	30 2' to 4'	

UP MOVING RAM PRESSES

50 & 100 Ton Stokes Molding Presses & Pumps
300 Ton Dunning & Boschert Molding Press
500, 800 Ton Waterbury-Farrel 3 & 4 Rod Presses, 6 & 6½" strokes
300 Ton Watson Stillman Press, 24x20" Platens
400 & 500 Ton Shaft Straighteners—Self Contained

All Hydraulic Equipment is completely engineered and checked by a competent staff, thus assuring reliability. Send us your Hydraulic problems.

IRONWORKER: Buffalo 25U x 20 Univ.
KEYSEATER: Mitts & Merrill, Baker Davis
PRESS BRAKE: #253, #335 Chicago
ROUTER: Onsrud #W240, #35 Oliver
SAWS: Wells, Catskill, Kal.
SHAPER: 8" Shaprite, Ammco, Atlas
SHEAR: Pexto, 6'14 Ga. Power, 6'x16 Ga.
SHEAR THROATLESS: #138 Lenox
SPEED LATHES: Cincinnati, Schauer
TAPPERS: Bakewell #1, Haskins #2C, 3C
THREAD ROLLER: Waterbury-Farrel #30 with Dies
THREADERS: Oster Pipe #394 & Bolt 542A
WELDERS: Seam; Thompson
WELDERS SPOT: Taylor-Winfield 50 KVA, Sciaky
WRAPPING ROLL: Buffalo #½

THIS IS ONLY A PARTIAL LISTING. WHY NOT SEND US YOUR INQUIRIES

WRITE FOR OUR FREE ILLUSTRATED CATALOG

AARON MACHINERY CO., Inc.

45 Crosby Street
WOrth 4-8233

New York 12, N. Y.
Cable: AARMACH, N. Y.

MDNA

Late Type — EVERY MACHINE TESTED AND GUARANTEED AS REPRESENTED — *Immediate Delivery*

LATHES

HENDEY 12"x12" tool room (1947)
PRATT & WHITNEY 14"x30" Model C (1946)
SOUTH BEND 16"x54", 14½"x8', 16"x8'
BRADFORD, 16"x6'
HENDEY 16"x8', taper attach.
RIVETT No. 608 taper attach. precision
LE BLOND "REGAL" 17"x14'
ELGIN & HARDINGE PRECISION, 1" cap.
PRATT & WHITNEY 16"x20", precision
PRATT & WHITNEY 13"x6', taper attach.
SEBASTIAN 12"x6' GH M.D.
AMERICAN 18"x8', M.D.
SPRINGFIELD 16"x6'; Motor in Base, 12 speeds
MONARCH 14"x8' GH TA
AMERICAN 26"x13' GH, QC, TA
REED PRENTICE 20"x8', Late, 1943
HARDINGE Precision second operation

TURRET LATHES

GISHOLT bar equip. preselector, #5, #1L.
WARNER & SWASEY #1A chucking
FOSTER #5 universal, bar feed
WARNER & SWASEY #1, ⅝" cap. hand.
BROWN & SHARPE #1 Hand Screw
BARDONS & OLIVER #5 Preselector 2" cap.

SHAPERS

Gould & Eberhardt, 20" Industrial
Stockbridge, 16" M.D.
Smith & Mills, 16" (1946)

DRILL PRESSES

American Radial, 6'x11" column
Avey, #2 single spindle, 15" overhang
Allen, 6 spindle, #2, 12" overhang
American Radial hole wizard 5'x11" col.
Delta ⅝" cap. floor drill
Cleerman drill box col. 25", #1M.T.
Walker-Turner Radial ½ H.P.

AMERICAN HOLE WIZARD RADIAL DRILL 6"x15" col.

GRINDERS

Cincinnati Universal Grinder 12"x36" ext. int.

NORTON #2 Universal Hydraulic Tool & Cutter
COVEL #31A tool & cutter universal
HEALD #72A3 plain internal, HYDRAULIC
BLANCHARD VERT. SURFACE, #10, 26" chuck
BLANCHARD, VERT. SURFACE, #11, 16" chuck
BROWN & SHARPE, #3 surface hydraulic
REID, SURFACE, 2B Pope spindle (1946)
RIVETT #104—Int.—Ext. Latest
BROWN & SHARPE #2 & #2B Surface
Excello Thread Grinder #31
GALLMEYER & LIVINGSTON 12x24 Hydraulic
Do-All Hyd. Surface Grinder 6"x18"
Wiraco Precision Internal
Cincinnati cylindrical 12x72" centers
CINCINNATI #2 Univ. tool grinder (1941)

BOREMATICS AND BORING MILLS

Defiance #25A Horizontal 3⅜" Bar
Lucas No. 41, 5" cap. extra long table

AUTOMATIC SCREW MACHINES

BROWN & SHARPE 00G ⅜" cap. & 0G ⅝" cap.
BROWN & SHARPE, 2G & #2, high speed
BROWN & SHARPE, #00, high speed ⅜" cap.

PLAIN MILLERS UNIVERSAL

BROWN & SHARPE, #3B, PLAIN
BROWN & SHARPE, #3 UNIVERSAL
CINCINNATI, #2MH, Universal, Vertical Attach.
VAN NORMAN #½ and #12, #22LI and #36SI
VERNON Miller, motor in base
CINCINNATI #3 plain M.D.
VAN NORMAN 28 & 38 plain horiz.
MILWAUKEE 4K plain horiz. dial type
LEES BRADNER Thread Miller 12"x14" HT

VERTICAL MILLERS

CINCINNATI, #3, #4, dial type
VAN NORMAN, #3V, rapid traverse
KEARNEY & TRECKER, #3KM, dial type
KEARNEY & TRECKER, #3H, dial type
PRATT & WHITNEY jig borers #2
SIP SWISS Jig Borer #5B Univ. Tilting Table
GORTON #8D Vertical high speed, powerfeed
DECKEL engraving machine model G-IL, 50-1
CINCINNATI #08 Vertical

PRODUCTION MILLERS

CINCINNATI #1-12 automatic
KEARNEY & TRECKER #1H-18 Mfg. type
BROWN & SHARPE #000, high speed

GEAR MACHINERY

FELLOWS #6IA Gear Shaper
GLEASON 24" cap. Bevel Gear Cutters
GOULD & EBERHARDT, #735, spur gears
Barber Coleman #12, 12" cap. & type S
Gleason 3" straight bevel & 3" spiral bevel
Gleason Gear Tester

MISCELLANEOUS

Niagara 6'x10 gage, 16" cap
Buesch #2 percussion press, 60 ton
Doall ML contour saw

ROW BOTTOM CAM MILLER

THIS IS A PARTIAL LISTING—TREMENDOUS STOCK ON HAND—YOUR INQUIRIES WILL RECEIVE OUR PROMPT AND COURTEOUS ATTENTION

CAPITOL MACHINERY CORPORATION

253 CENTRE STREET : PHONE WO. 4-7615-6 NEW YORK 13, N. Y.

MBNA MEMBER

LIQUIDATION SALE

LATEST TYPE
MACHINE TOOLS

THE GENERAL MACHINE SHOP of TITUSVILLE, PENNSYLVANIA has authorized us to sell at a PRIVATE LIQUIDATION SALE their surplus late type MACHINE TOOLS on a first come, first served basis.

PARTIAL LIST INCLUDES

No. 340T GIDDINGS & LEWIS Table Type Horizontal Boring Mill, 4" bar, 2" auxiliary spindle, 1943

No. 4H LIBBY Turret Lathe, 12" hole in spindle, 3 and 4 jaw chucks, 1943

No. 4A WARNER & SWASEY, full leadscrew, taper attach., tooling, 1942

No. 3A WARNER & SWASEY, bar feed, taper attach., threading attach., tooling, 1942

No. 2A WARNER & SWASEY, bar feed, taper attach., threading attach., tooling, 1942

No. 2A WARNER & SWASEY, bar feed, 4' extra bed length, taper attach., steady rest, 1941

24" GOULD & EBERHARDT "Industrial" Shaper, 1942

5'-15" col. AMERICAN "Holewizard" Radial, box table, 1942

16"x54" LODGE & SHIPLEY Toolroom Lathe, taper, chucks, 1943

36"x20' bed AMERICAN High Duty, Timken spindle, Engine Lathe, 12' centers, 1942

No. 3 CINCINNATI Dial Type Milling Machine, vert. head, 1941

No. 5 CINCINNATI High Power Milling Machine, vert. head, 1943

No. 24 BRYANT Internal Grinder, 1942

10 ton DOMINION Crane, 42' span, AC motors, 1941

In addition to the above machines there are many other Lathes, Milling Machines, Drill Presses, Tool & Cutter Grinders, Planers and Shapers. In all, there are sixty-five machines available in this plant. All machines motor driven 3/60/220/440

Inspect under power—no red tape—see and buy
For inspection or further details contact:

O'CONNELL MACHINERY COMPANY

1825 NIAGARA STREET BUFFALO 7, NEW YORK

Phone: BEdford 8500

DAVENPORTS
IMMEDIATE SALE AND DELIVERY

1—Only Davenport 5 spindle automatic model B 9/16 capacity 1800 serial (1943) complete with threading and stationary burring attachments and chip conveyor 7½ H.P. 3 phase 220-440 volt 60 cycle motor.

1—Only Davenport 5 spindle automatic model B 9/16 capacity 1300 serial (1941) complete with stationary burring, threading attachments, center drive, countersink arm and fifth position slide 7½ H.P. 3 phase 220 volt 60 cycle motor. Test under power.

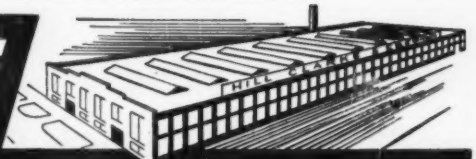
FS-9104, AMERICAN MACHINIST
330 W. 42nd St., New York 18, N. Y.

PUT YOUR IDLE CAPACITY TO WORK

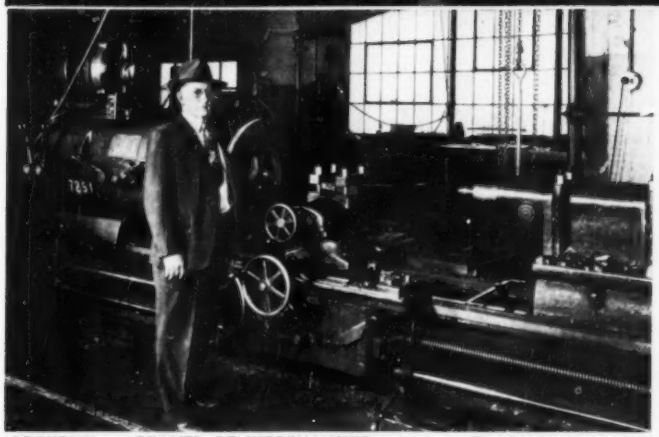
Hundreds of metalworking companies are finding profitable business today outside their regular lines. Tell metalworking America—the 100,000 readers of AMERICAN MACHINIST—about your facilities. Write for rates.

Contract Work Section
AMERICAN MACHINIST
330 W. 42nd St., New York 18, N. Y.

HILL-CLARKE MACHINERY COMPANY



ESTABLISHED 1867 • H. W. MONS, President • W. L. DITFURTH, Vice-President • T. H. PRICE, Secretary



ECONOMY — QUALITY OF WORKMANSHIP are reasons The BAUER BROS. CO., Machinery Manufacturers, Springfield, Ohio look first to Hill-Clarke for dependable used machine tools. EDWARD A. ULLIMAN, SUPT. pictured beside a 36" Lodge & Shipley Lathe purchased from Hill-Clarke.

AUTOMATICS

No. 2 Brown & Sharpe
1⅛" Greenlee, 6 Spdls. (1941)
No. 81 New Britain 6 Spdls. 1⅜" (1942)
No. 6 Brown & Sharpe
No. 49 New Britain, 4 Spdl. chucker
Model A 2½" Cleveland (1943)
Model A 3¼" Cleveland (1942)

DRILLS

No. 150 Baker
No. D8 Colburn, No. 6 Morse Taper
No. 1LMS—20"—5 Spdle. Leland-Gifford
No. 2LMS—26"—1 Spdl. Leland-Gifford
No. 2LMS—14"—3 Spdl. Leland-Gifford
No. 2LMS—28"—4 Spdl. Leland-Gifford
No. 2LMS—28"—6 Spdl. Leland-Gifford
No. 4BL Natco 36 Spdl.
6'-17" Col. Fosdick Radial
7'-15" Col. American Full Universal

GEAR MACHINES

No. 61-A Bellows Gear Shaper (1942)
No. 7125 Fellows (1943)
No. 712 Fellows Auto Indexing (1943)
No. 72 Fellows Gear Shaper
No. 16 H5 Gould & Eberhardt
No. 18H Gould & Eberhardt
No. 6 Gleason Gear Tester
12" Gleason Bevel Gear Cutter
37" Gleason Bevel Gear Planer
72" Cincinnati Gear Cutter

HORIZONTAL BORING MILLS

No. 31 Lucas, 3" bar
No. 46-B Heald Bore-Matic
No. 112—C Excello 2 Spdl.

GRINDERS

3"x12" Brown & Sharpe No. 5 (1944)
4"x12" Landis, Model H (1942)
6"x18" Norton Type C Plain (1943)
6"x30" Norton Type C Plain (1943)
10"-14"x36" Norton Type C Plain (1942)
10"x18" Norton Type C Plain (1943)
10"x48" Norton Type C Plain (1943)
Norton Motorized Grinders ranging from 6"x18" to 24"x240"
18"x48" Mattison Hyd. Surf. Gdr. (1942)
No. 5—8"x24" Covel Hydr. Surf. (1941)
No. 36-A Hanchett Rotary Surface
18"x48" Mattison (1948)
72A-3 Heald Internal Grinder (1942)
72A-5 Heald Internal Grinder (1942)

FOR YOUR PROTECTION only Hill-Clarke offers THIS 5 WAY GUARANTEE

1. A responsible organization—82 years experience.
2. A 50,000 sq. ft. plant equipped with complete and modern facilities plus experienced craftsmen for remanufacturing machine tools.
3. Modern machines—no worn out equipment.
4. You can see your machine tested under power before purchasing.
5. Hill-Clarke's unconditional money-back guarantee.

74 Heald Internal Gdr. (1942)
No. 5 Bryant Internal Grinder (1942)
No. 16-16 Bryant Internal Grinder (1942)
No. 16-38 Bryant Internal Grinder (1942)
No. 24-26 Bryant Internal Grinder (1941)

LATHES

15"x5' Sebastian, Grd. Head
16"x54" centers LeBlond (1941)
16"x60" centers Pratt & Whitney, Model B
18"x6' American, Grd. Head
19"-38" gap x 10' LeBlond
36"x30' Lodge & Shipley
36"—48"x16' Lehman Hydratrol (1945)
50"x17' centers LeBlond (1942)

LATHES (Production)

8"x15" Sundstrand, Model D (1943)
10"x16" Sundstrand, Model D (1942)
10"x22" Sundstrand, Model AA (1943)
15"x33" Fay Automatic (1942)
20"x25" Fay Automatics (1942)

MILLING MACHINES

No. 2 SP Van Norman Plain (1942)
No. 4 Cincinnati Plain (1943)
No. 2 H Milwaukee Vertical (1942)
No. 2 Cincinnati Vert. (1942)
No. 2M Cincinnati Vert. (1941)
No. 3 Cincinnati H.P. Vertical
Linley Vert. Miller No. 1 U. S. Hand Miller
No. 1-18 Cinn. Mig. (1940)
No 2—18" Sundstrand-Electromil (1942)
No. M-24 Milwaukee Simplex (1942)
38"x40"x10' Fitchburg Duplex Miller (1943)
No. 4-48 Cincinnati Hyd. Tracer (1942)
No. 34-48 Cincinnati Hyd. Duplex
No. 45-48 Cinn. Hyd. Duplex
No. 56-72 Cincinnati Hydromatic
4½"x12" Pratt & Whitney, Model C
4"x9" Hanson-Whitney Univ. Thrd. Miller
6"x36" Lees-Bradner—Model HT (1943)
6"x48" Pratt & Whitney Thrd. Miller
6"x80" Pratt & Whitney Thread
6"x132" Pratt & Whitney Thread Miller
6"x168" Pratt & Whitney Thread
10"x48" Hanson-Whitney Thread
24"x24"x12" Ingersoll Adj. Rail
36"x36"x16' Ingersoll Slab Miller
No. 10 Ingersoll 72"x6' Travelling Col. Face Millers (1942)

MISCELLANEOUS

18" Dill Slotter
Model H-7 Micromatic Hydro Honer
Model H-2 Micromatic Hydro Honer
Model 200 Micromatic Hydro Honer
8-M Wells Band Saw
Model H-100 Micromatic Hydro Honer
Model 200—HS Micromatic Horiz. Hone
No. 2 V & O open back press
Baush Radial Tapper (1942)
No. 304 Bliss Press

PLANERS

36"x36"x12' Cincinnati
36"x36"x18' Gray, 4 Heads
48"x36"x14' Gray
48"x48"x12' Cincinnati, 4 Heads

TURRET LATHES

No. 4 Gisholt Univ. Turret Lathe (1942)
No. 4R Libby, Bar Feed (1942)
No. H-5 Libby
No. 5 Bardons & Olivers (1942)
No. 5 Midland, Bar Feed (1942)
No. 2-A Warner & Swasey
No. 1-H Libby, 6¼" Hole in Spindle (1937)
No. 1-H Libby, Extra Long Bed (1942)
18" Libby, 3½" Hole in Spindle
No. 4A Warner & Swasey, 7½" Hole in Spindle

VERTICAL BORING MILLS

42" Bullard New Era
42" Colburn
60" Colburn
72" Niles Extra Heavy
84" Betts

FEATURE OF THE MONTH

This late model No. 36 A. Hanchette Automatic Rotary Surface Grinder gives you extra high production with savings in purchase cost. Inspect it at our plant now.

Ask for our NEW GREEN LIST

Write, Wire or Phone **HILL-CLARKE MACHINERY COMPANY**
651 WASHINGTON BOULEVARD, CHICAGO 6, ILL. PHONE CEntral 6-0500

Cut Costs with These BOTWINIK BROS. MACHINE TOOLS

DRILLS

Cinn. Gilbert 4'11" Col. M.D. Radial
Baush M.D. Multi 12 Spd. No. 3 M.T.
Avey & Allen 3, 4, 5 & 6 Spindle.
Cinn. Bickford M.D. 6' Radial.
Niles Bement & Pond 6' Radial.
Fox M.D. Type 138C Multi-Spld. Late.
American 6' 15" Gear Drive Radial.
American 3' 9" M.D. Maxi-Speed Radial.

GRINDERS

Norton 6" x 10" x 36" Surface.
B & S Nos. 1, 2, 3, 4, Univ.
Bryant Nos. 3B, 6, & 12 Internal.
Excello No. 31 Thread.
Cincinnati Nos. 2 & 3 Centerless.
Cin. No. 2 M.D. Univ. Cutter & Tool.
Landis 4" x 18" Type H, Pl. M.D. Hyd.
Blanchard No. 16—26" and 16A.
Heald No. 25A—16" Rotary Surface.
Heald Nos. 70A and 72A Internal.
Abrasive Nos. 33, 3 & 34 Sur.
Pratt & Whitney 14" B.B. Vert. M.D.
Norton Type "C" 6" x 18" M.D. Hyd. Cyl.
Norton 10" x 24" M.D. Plain Cyl.

LATHES

Lodge & Shipley 36"x16' M.D. G.H. Q.C.G. Eng.
Johnson 36" x 36' B.G. L.C.G. Eng.
Monarch 12" x 30" C.K. (Swings 18").
Hendey Plain 12", 14", 16", 18" Yoke Head.
American 24"x12' M.D., G.H., Q.C.G. Eng.
American 30" x 15' G.H. M.D. Q.C.G. Eng.
American 30"x25' G.H. Q.C.G. M.D. Eng.
Hendey 24"x8' M.D. Q.C.G. Eng.
Hendey 12"x5' M.D. Geared Head.

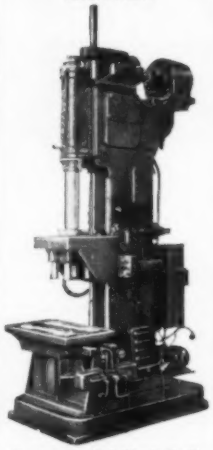
MILLERS

K & T 3K Vert. Sliding Head M.D. Late.
K & T 2H D.O. M.D. Plain Late.
K & T 2H Vert. Sliding Head, M.D. Late.
Milwaukee No. 1 1/2B Univ. M.D.
Cincinnati No. 2 Univ. Rect. Overarm
Cincinnati 0-8 M.D. Prod. Late.
Milwaukee No. 3B Univ. D.O.
Cincinnati 2 & 3 Vert.
Van Norman 35P Plain.
Brown & Sharpe No. 3 Vert.
Van Norman 22L—Ram Type Duplex Late.
Van Norman Nos. 0, 6, 10 & 11.
Pratt & Whitney 8", 10" & 12" Auto.
Cincinnati 18" & 24" Production.
Pratt & Whitney 6" x 80" M.D. Thread.
B & S No. 12 M.D. Plain Prod. Late.
Kempsmith No. 2G Plain. Late.
Garton 9J Vert. Late.
Brown & Sharpe No. 21 Plain Auto.
Kempsmith No. 4 Plain Maximiller. Late.

SHAPERS

Gould & Eberhardt 16" & 20" M.D. Crank.
Hansen Whitney Univ. Vert. Tool & Die.

Actual Photo



Barnes No. H-2 Single Spdl. Hydram Prod. Drill, with 4 Spdl. Multi-Spdl. Head

PRESSES

Henry & Wright 60 Ton Dieing
Bliss No. 315 O.B. Geared Power
Verson No. 10B42—500 Ton M.D. Twin-Geared S.S.
Bliss No. 304 M.D. S.S. Single Crank.
Bliss No. 52 2¼ Stroke B.G. M.D. S.S.
Stoll No. 4 Double Crank.
Bliss #3¾A Toggle
Diamond No. 30, 30 Ton M.D. O.B.I. 3" St.
Walsh No. 4 3½" St., M.D. O.B.I.

SCREW MACHINES

B&S #00G, 0G & 2G Auto. M.D.
Brown & Sharpe Nos. 00, 0, 2, 4 & 6 Auto.
Brown & Sharpe Nos. 1 & 2 Hand.
W&S Nos. 1, 2, 2A, 3A Univ.
Gridley 7/8", 1 1/4", 1¾" and 2⅝" Model "G."
Cleveland 2½" Model K.
J & L No. 5 M.D. Turret. Late.
Acme 6W M.D. Turret. Late.
Cone 1¼", 3½", 3½", & 4¼"—4 Spindle.
Cleveland 6¾", 7¾" Model A.

PLASTIC MACHINES

INJECTION MOULDING

Reed Prentice 2-Ounce
H.P.M. 4-Ounce
Watson-Stillman 6-Ounce

New, Used and Engineered Rebuilt Machine Tools

50th ANNIVERSARY

Botwinik Bros.

INCORPORATED

EXPORT DEPARTMENT: 44 G WHITEHALL ST., NEW YORK 4, N.Y., U.S.A.

373 WELTON STREET, NEW HAVEN 9, CONNECTICUT

AUTOMATICS

No. 16 New Britain 6 spdl. chucking
No. 454 New Britain chucking
14"x18" Fay Chucking
6" Bullard 6 spindle Mult-Au-Matic
½", No. 0G Brown & Sharpe
⅝" Acme Gridley Model R6
⅞" & 1¼" Cone 4 spindle
1" Economy shaver, hopper feed
1⅛" Cleveland 4 spindle
1⅛" New Britain, Model 61
1⅞" Conomatic 8 spindle
2"x18" Cleveland Model B
2⅛" Acme Gridley Model RA6

BORING MILLS

100" Niles Bement Pond vertical
52" King vertical
24", 30" & 42" Bullard vertical
2½" bar, No. 25 Giddings & Lewis
3" bar, No. 3A Universal
3⅜" bar, No. 5A Defiance
3¾" bar, No. 32 Lucas
5" bar Jones, planer table type
Nos. 112B & 2112 Excello precision
Nos. 42, 47A & 48A Heald Borematic

GRINDERS

10"x72" Colonial broach grinder
Nos. 33 & 35 Excello thread
Nos. 1 & 2 Brown & Sharpe univ.
10"x24" Landis hydr. universal
No. 2 Norton univ. tool & cutter
26", No. 226 Gardner disc
53", No. 372 Besly horiz. disc
No. 115 Gardner opposed disc
No. 230 Hanchett opposed disc
No. 2 Cincinnati centerless
No. 510 Oliver drill grinder
Nos. 6G & 10G Sellers drill grinders
Norton, 6"x18", 10"x36" & 23"x36"
Landis 6"x18", 14"x36"
No. 2B Brown & Sharpe surface
12"x48" Thompson surface
14"x60" Mattison surface
No. 34 Abrasive surface
16" & 24", No. 25A Hei_ surface
12" & 16", No. 22 Heal_ surface
Nos. 72A3, 72A5, 74 Heald internal
No. 72A3 Heald Sizematic
No. 72A3 Heald Sizematic centerless
Nos. 16A16, 16-28, 16-36 & 24-36 Bryant

LATHES

36"x16' Bridgeford
25"x48" centers Lebland
20"x8' Lodge & Shipley
18"x8' Rockford
16"x30" centers Monarch
16"x5' Sebastian
14"x6' Lodge & Shipley

LATHES, TURRET

Nos. 2, 4, 5, 1A & 3A Warner & Swasey
Nos. 5 & 7 Bardons & Oliver
Nos. 3, 4 & 3AL Gisholt
24" & 42" Bullard vertical
No. 82 Denver
No. 4 Midland
Nos. 2G & 3 Morey
3"x36" & 4"x34" Jones & Lamson

SHAPERS & PLANERS

6" Pratt & Whitney vert. shaper
18" Bement Miles slotter
18", 20", 24" & 28" G&E shapers
28" & 24" Gemco univ. shapers
24" Columbia univ. shaper
30"x24"x8' Liberty openside planer

SHEET METAL TOOLS

8'x¼" Cincinnati press brake
8' x 10 ga. Dreis & Krump leaf brake
10' x 14 ga. Dreis & Krump leaf brake
8' x 10 ga. Beloit bending roll
No. 202½ V. & O. thread roller
72" x 14 ga. Wysong & Miles shear
88", 14 ga. Pettingell rotary shear
Nos. P1, P2, P3, P4, P5 Ferracute presses
Nos. 18 & 19 Bliss OBI presses
No. 8 American Can OBI press

MILES MACHINERY CO.
SAGINAW, MICH.

BEST BUYS

No. 4A WARNER & SWASEY Turret Lathe, serial over 329,000.

36"x24"x72" INGERSOLL Adj. Rail Milling Machine, serial 4339.

No. 44 UNIVERSAL "TRI-WAY" Horizontal Boring Machine, ser. T-4422.

14"x144" NORTON Plain Cyl. Grinder.

Wigglesworth Machinery Co.
197 Beat Street, Cambridge, Mass.

National Bent Shank Nut Tappers Battery of 5/16" to 1" Machines.

Waterbury-Farrel Fdry. 5/8" and 1" D.S. S.D. Cold Headers, also Thread Rollers.

Fisher 5" Bar, Floor Type Boring Mill. New in 1942.

Niles, Bement, Pond 60"x60"x24' table 4-Head Planer, Rev. D.C. M.D.

Bliss Presses in all sizes up to 1,000 ton capacity.

Wire Working Machinery.

National Machinery Exchange
128-138 Mott St., New York 13, N. Y.

LATEST TYPE NEARLY NEW MACHINES

PRESS BRAKES

CINCINNATI #300-8 all steel, Cap. ½" x 8'6"
CINCINNATI #50 series all steel, Cap. 3/16" x 8'—LATEST TYPE
CINCINNATI #50 series all steel, Cap. ¼" x 6'—LATEST TYPE
VERSON #206 all steel, Cap. 10 gauge over 1⅛" x 78"—LATEST TYPE

SHEARS

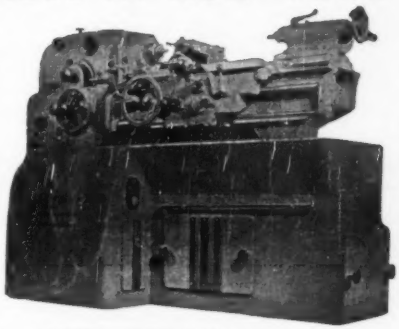
NIAGARA #3120 Power Squaring, Cap. 10 gauge x 10'—LATEST TYPE
WYSONG & MILES #572 Power Squaring (Shearmaster), Cap. 14 gauge x 6'—LATEST TYPE

DIEING PRESS

HENRY & WRIGHT 50-ton, 2" stroke, roll feeds

MAY BE INSPECTED UNDER POWER IN CANTON, OHIO

AVAILABLE IN NEW YORK STOCK



BORING MILLS—Horizontal

CINCINNATI GILBERT 3¼" bar, floor type, latest
DETRICK & HARVEY 6" bar, Floor Type, M.D.
GIDDINGS & LEWIS #2ST, 2¾" Bar—latest
GIDDINGS & LEWIS #45, 5" Bar, Table Type, latest
LUCAS #41, 3" bar, Table Type, Latest Type
NILES BEMENT POND 5", 6", 8", bar, fl. type, M.D.
UNIVERSAL, 3" bar, high speed, latest type

BORING MILLS—Vertical

BETTS 120", 2 swivel heads, AC Motor Drive
BULLARD 16", 6 spindle Multaumatic, Latest Type
BULLARD 24", "Spiral Drive" Latest Type
BULLARD 61" "Maxi-Miller", 2 heads, Motor Drive
COLBURN 72", 2 Swivel Heads, M.D.
KING 62", 2 swivel heads, PRT, M.D.
NILES 160", 2 swivel heads, PRT, DC, M.D.

DRILLS

AMERICAN 3' arm 9" column, "Hole Wizard", latest
AMERICAN 4' arm 11" column, "Hole Wizard", latest
LELAND & GIFFORD #1LMS, 4 spindle, latest
LELAND & GIFFORD #2LMS, 6 spindle, latest

GEAR CUTTING EQUIPMENT

FELLOWS #61A, #61, #7, #7A, #72, #75, #77 High Speed Gear Shapers, latest type
FELLOWS #Z, #6Z2, Gear Shaper, latest
GLEASON 32" 12" straight bevel generator, Latest
GOULD & EBERHARDT #12H, Hobber, Latest
GOULD & EBERHARDT #96H, Hobber, with diff., M.D.

GRINDERS—Cyl.—Plain & Univ.

BROWN & SHARPE #1, 2, 3, 4, Universal, Latest
LANDIS 4x13, Type H Plain Hyd., Latest
NORTON 6x18", 10x72", 14x36", Type C, Plain, latest
NORTON 6x36", 10x36" type C, Plain Hydr., Latest

GRINDERS—Miscellaneous

BRYANT #16-CP-16, #24 Int. Hyd., latest
CINCINNATI #2 Centerless "Filmatic", latest
CINCINNATI Centerless Lapper, Model ED, Latest
COVEL #22 Universal Tool & Cutter, Latest Type
HEALD 75A, 72A3, 72A5, 74, 70A Internal, latest
LANDIS #12 Centerless, Hydraulic, latest type

GRINDERS—Surface

HANCHETT Series 300, 12x18" Vert. spdl. hyd., latest
HEALD #22 Rotary, 12" chuck, latest type
HEALD #7A—rotary—16" and 20" chuck, hyd., latest
THOMPSON 12x12x24 Model B Hyd., Latest Type

LATHES—Engine & Mfg.

AMERICAN 36"x360" centers, 2 carriages, motor dr.
LEHMANN 16x30" centers, TIMKEN, latest type
LoSWING 4x60, 4x84, 8x80, 8x108, 5x34, Latest
MONARCH 12"x54" centers, Timken, Latest Type
MONARCH 10x20" centers, Model EE, Timken, latest
MONARCH 16"x78" centers, Timken, Latest type
MONARCH 22"x456" centers, Timken, M.D.
NILES 30x50' Boring, Timken, Latest Type
PRATT & WHITNEY 14"x54" centers, 16"x30" centers, Type C, Timken, Latest
SPRINGFIELD 16"x30" centers, Timken, Latest Type
WARD, HAGGAS & SMITH—18/30x60" centers gap

LATHES—Turret

BARDONS & OLIVER #5, #7, Timken, Latest Type
FOSTER #4FU "Fastermatic" Timken, Latest
GISHOLT #1L, #2L, #3L Universal Timken, Latest
GISHOLT #3, #4 Univ., TIMKEN, Latest Type
JONES & LAMSON #3, #6 Univ., Timken, Latest
LIBBEY "International" 1-H5, Univ., Timken, latest
MOREY No. 2G, No. 3, No. 4, Timken Bearing, latest
POTTER & JOHNSTON #3D, #5D2E, Timken, latest
WARNER & SWASEY #1, 2, 3, Ham—Timken, latest
WARNER & SWASEY #2A Universal, Timken, Bar & Chucking, Latest Type
WARNER & SWASEY No. 4A, 8" bar, serial over 1,000,000, Latest Type, New 1947

MILLING MACHINES—Plain

BROWN & SHARPE #2, Light Type, Timken, latest
BROWN & SHARPE 2B, 3B, Timken, Latest Type
CINCINNATI 0-8 Auto., Rise & Fall, Latest Type
CINCINNATI #4 TIMKEN, Motor Drive
CINCINNATI 4-36, 2-18 Hyd., Simplex, latest
KEARNEY & TRECKER 2H, 3H, 4H, Timken, latest
KEARNEY & TRECKER #3, 4, Hvy., Timken, M.D.
KEMPSMITH #3G, Timken, latest type
KEMPSMITH #4 Maximiller, Timken, latest type

MILLING MACHINES—Vertical

BROWN & SHARPE #2, Timken, latest type
CINCINNATI #2 Dial Type, Timken, latest type
GORTON #8½D, 9J high speed, latest
KEARNEY & TRECKER #3H, Timken Bearing, Latest
REED PRENTICE 3VG, with duplicator, Latest

SCREW MACHINES—Automatic

CLEVELAND 9/16", 1¼" model A, high speed, latest type
CONOMATIC 6", 4 spindle, latest type
CONOMATIC 2⅝"—6 spindle, Latest Type
GOSS & DeLEEUW 8" auto. Chucker, 5 spind., latest

MISCELLANEOUS

AJAX 2", 3½" Forging and Upsetting, M.D.
AMERICAN V-2, 6 ton 26" stroke Vert. Broach, latest
BARNES #172, 306H, 307 Vertical Hone, Hydraulic, Self-Oiling, Latest Type
CINCINNATI 1-36, 3-30 Duplex Vert. Surface Broach, Double ram, Model ER, Hyd., Latest Type
FOSDICK Model 42 Jig Borer latest type, New 1947
LAKE ERIE 500 ton Vertical Hydraulic Press, latest
MICHIGAN #1708A Cutter Reliever, Latest Type
MONARCH 10x20" centers Model EE, Toolmakers Lathe
NILES "Time Saver" 48"x48"x13' Planer—3 heads, Box Table, P.R.T., Latest Type
PRATT & WHITNEY (KELLER) Type BL-2416 & Type G Copying, latest type, 2 & 3 Dimensional
PRATT & WHITNEY ½Bx50 Rifler, Latest Type
PRATT & WHITNEY 6x60 Thread Miller, latest
QUICKWORK ⅜"x1" cap. Rotary Shear—M.D.

Available for Prompt Shipment ***Most Built After 1941***

(Partial List) Over 2,000 Machine Tools In Stock. Your Inquiries Are Invited . . . Prompt Service Is Assured

MOREY MACHINERY CO., INC.
406 BROOME ST., NEW YORK 13, N. Y.
TELEPHONE: CANAL 6-5360
CABLE ADDRESS: WOODWORK, N. Y.

EMERMAN *Offers from* STOCK

INGERSOLL VERTICAL ADJUSTABLE RAIL OPEN SIDE MILLING AND BORING MACHINE

Single vertical spindle. 5" boring bar. Height from top of table to face of saddle, Max., 48"; Min., 3½". Bed length 20'. Table working surface 48"x10'. Table feeds obtained by Johnson drive mechanism. Motors required: 5 H.P. DC, 10 H.P. AC, 15 H.P. DC. Pendant controlled crossrail and clutch. Weight about 59,000 lbs.

EMERMAN
MACHINERY CORP.
875 W. 120th STREET
CHICAGO 43, ILLINOIS

Nos. 00G, 0G & 2G B & S High Speed Autos.
Model B Davenport Automatic.
Model 61 New Britain 6-spin. 1⅝" Autos.

D. E. DONY MACHINERY CO.
47 Laurelton Rd., Rochester 9, N. Y.

LATHES FOR SALE

BRIDGEFORD 36"x24" Centers Motor Drive
JONES & LAMSON "FAY" 20"x25" Auto. Latest
LODGE & SHIPLEY 18"x72" Centers Motor Drive
NILES 30"x50' boring "Time Saver" Latest Type
PUTNAM 42"x25' centers Geared Motor Drive
SCHUMACHER & BOYE 24x158" Centers geared MD

HARRISON MACHINERY EXCHANGE INC.
South 4th St. Harrison, N. J.
Tel.: HUMBOLDT 2-5750, 2-5775

SURPLUS

CENTURY LATHES

Built for Russian Gov't—Unable to deliver due to national conditions—20—16"x54" centers — 18" swing — weight 2½ tons—regular comparable $6,000.00 value. Sold at reduced price as long as they last in this size only.

McIlvanie Machine Works
12 So. 6th Avenue
Yakima, Washington

Your inquiry will have special value . . .

if you mention this magazine, when writing advertisers. Naturally, the publisher will appreciate it . . . but, more important, it will identify you as one of the men the advertiser wants to reach with this message . . . and help to make possible enlarged future service to you as a reader.

HEADLINERS

ALL NEW SINCE 1940

MILLERS

=1-18 CINCINNATI Plain Automatic, backlash eliminator
Type "P" OHIO Production

LATHES

15"x6' LEBLOND "Regal"
16"x6' CINCINNATI 12-speed Geared Head

TURRET LATHES

=4-L GISHOLT Heavy Duty, hardened strip ways, threading attachment to both carriages, $6750.00

=3 WARNER & SWASEY, bar feed
=601-DD OSTER "Rapiduction", bar feed

AUTOMATIC LATHES

16"x21" FAY—16"x51" FAY

DRILLS

24" CINCINNATI-BICKFORD "Super Service"

GRINDERS

10"x24" LANDIS Type "C" Hydraulic Universal
=22 HEALD 12" Rotary Surface
=4 GARDNER 23" Disc
=510 OLIVER Twist Drill

MANY OTHER MACHINES IN STOCK. TELL US OF YOUR REQUIREMENTS.

COX MACHINERY CO.,
P. O. Box 1953 CINCINNATI 1, OHIO
OFFICE AND WAREHOUSE: 311-313 Rockwell St. Covington, Kentucky
Three minutes from the Cincinnati hotel district.

Bor. Mill, Hor. 3" G & L MD. 4½" N-B-P—MD.
Boring Mills, 24"-30"-42"-52"
Drills, Radial 3'-4'-5'-6' Cin.-Bick.
Lathe, Turret 3-A W and S, S.P.D.
Millers, Plain No. 3 K and T. No. 4 Cin.
Millers, Vertical No. 3 and No. 4 Cin.
Shaper, 16"-20"-24"-36".
Shaper, 36" Morton Draw Cut.
Shears, 42"-60"-72"-132"

West Penn Machinery Company
1210 House Bldg. Pittsburgh, Pa.

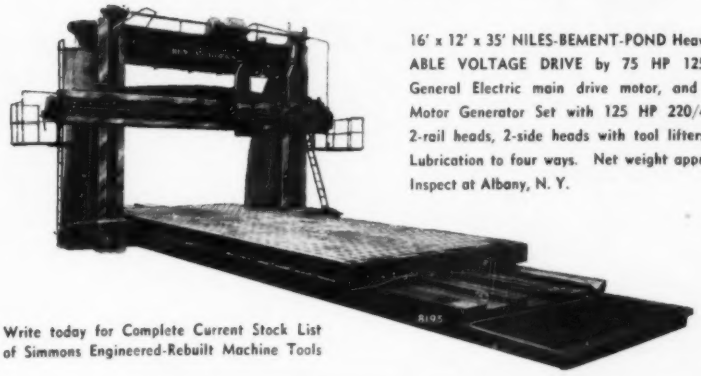
For Every Business Want
Think "Searchlight" First!

"Searchlight" is the classified advertising of Employment, Equipment and Business Opportunities in American Machinist. It reflects current opportunities, both offered and wanted. Use it for your business wants.

SIMMONS ENGINEERED Machine Tool REBUILDING NEWS

SIMMONS MACHINE TOOL CORPORATION • MAIN OFFICE AND PLANT, 1759 N. BROADWAY, ALBANY, N. Y.

LOOK AT THIS HEAVY NILES PLANER!



16' x 12' x 35' NILES-BEMENT-POND Heavy Planer. VARIABLE VOLTAGE DRIVE by 75 HP 125/330/530 Volt General Electric main drive motor, and 75 KW G. E. Motor Generator Set with 125 HP 220/440 volt motor. 2-rail heads, 2-side heads with tool lifters. Forced Feed Lubrication to four ways. Net weight approx. 421,000 lbs. Inspect at Albany, N. Y.

Write today for Complete Current Stock List of Simmons Engineered-Rebuilt Machine Tools

NEW YORK CITY OFFICE: 50 EAST 42nd STREET

Metal Forming and Bending Machine
#206-F Toledo 155 Ton D.C. Press, 3" Stroke, 20" x 110" Bed Area
¼" x 144" Dreis & Krump Squaring Shear
Roller Type Slab Miller 22" Slab capacity
12 Spindle Moline Automatic Drilling Machine
3 Spindle Moline Model 7-D Cylinder Borer
1-A W&S Universal Turret Lathe
36" x 14' Schumacher & Boye Engine Lathe
Libby 26" x 4½" Spindle Turret Lathe
26" Stockbridge Shaper
Lees-Bradner CT 36" Thread Millers
10" x 48" Roll Grinder
Foote-Burt 4 Spindle Drill #2 M.T.
Acme Gridley 4 Sp—Model G—1¾" Auto.

CONTINENTAL SALVAGE & MACHINERY CORPORATION
1836 EUCLID AVENUE, CLEVELAND 15, OHIO
MAIN 4402

FOR SALE

Metallizing gun and all accessories. Brand new equipment, never used, at less than half price. Reply

FS-9106, AMERICAN MACHINIST
330 W. 42nd St., New York 18, N. Y.

No. 25T G. & L., 2½" table Hor. Mill, 1942
4" Univ. Table Mill, 60" vert., 96" hor., 1943
36" & 42" King Side Hd. Vert. Mills, '43
Nos. 1A & 3 W. & S. Turrets, bar & chuck
No. 4 Gisholt Turret, bar & chuck, '42
3' 11" Fosdick & 3' 9" Amer. Radials, '43
28/60 Cinci. Hydrotel Vert. Miller, 1 spin., 360° Cinci. 4 Spin. Profiler, 1942
Nos. 3 & 2MH Cinci. Pl. Dial Millers, late
Nos. 3K & 3H K. & T. Pl. Dial Millers, late
No. 36 Van Norman Pl. Miller, ram, '43
No. 2G Kempsmith Univ. Miller, 1943 (3)
No. 2416 Keller Duplicator, late
Nos. 9J Gorton Duplicator & Vert. Miller (2)
Bridgeport Vert. Miller, slotting (3)
12"x24" G. & L. No. 45 Surface Grinder, '42
No. 70A Heald Internal Grinder, 1942
Gear Cutter, No. 13 B. & S., spur & bevel

BENNETT MACHINERY CO.
30 Church St., New York 7, N. Y.

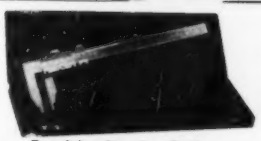
AUTOMATICS—Natl. Acme 1⅝", four spindle, Bargain (2)
GRINDER—(Rotary) Blanchard 25" mag. chuck, belt—$500.00
HYDROHONER—Micromatic Model #4H (1943)
LATHE—Bamford-Chase Tool Room, 14"x6' Taper, Late.
Bridgeford, Engine, g. head, 32"x21' centers.
MILLER—Plain K. & T. #4K, Late.
PLANER—Cleveland Openside 60"x60"x20', Late. Niles Bement Pond 48"x48"x26', 4 heads.
PRESSES—(2) Bliss #305, 100 ton, Late.
(2) Bliss #6, 125 ton, Late.
Clearing—200 Ton (1943)
Bliss #310—440 Ton
(1) Lake Erie, 750 ton, Hydraulic, Bed 72"x146" single or dble action, Late.
SHEARS—Niagara 10'x10 G. gap
Barth (New) 54"x14 G.
WELDERS—(New) Sterling 10, 30 KVA, Bargain.

KINGS COUNTY MACHINERY EXCHANGE
408 Atlantic Ave., Brooklyn 17, N. Y.
Dept. "A"
Phone: TRiangle 5-5237

2—Lodge & Shipley Duomatic lathes
2—Potter & Johnston #3 DE Chucking machines
1—D. E. Whiton #16 gear cutter
1—Monarch Lathe, 22 x 48"
1—3 spindle Gould & Eberhardt spur gear and bevel roughter
1—Heald double spindle Barcomatic

SIER-BATH GEAR & PUMP CO., INC.
9252 Hudson Boulevard, North Bergen, N. J.

POWER PRESSES
BLISS, TOLEDO, V & O, ETC.
REBUILT — GUARANTEED
MONA
JOSEPH **HYMAN** & SONS
Tioga, Livingston and Almond Streets
Philadelphia, Pa.



Precision Vernier Caliper
SURPLUS SPECIAL

250 MM Size
Heads to 1.50th MM
Jaw Depth 62 MM
Scales are machine divided and mechanically etched
Can be easily read
Induction heat treated jaws ground and lapped for long wear.
Excellent appearance is achieved by finish grinding, machine polishing, and fine lapping
For internal and external measurements
Tool steel blades, stress relief annealed, hardened by electronic methods
Tee Slots are precision milled and broached

One of the finest precision Calipers available. Each Caliper individually boxed in a handsome leatherette, plush lined, fitted case. Manufactured by American Measuring Instruments Corp. Cat. #20. Regular price about $45 . . . OUR SURPLUS SPECIAL!! $13.95 ea. F.O.B. NYC. All units are brand new, fully guaranteed.

STANDARD RADIO ELECTRICAL PRODUCTS
2260 WASHINGTON AVE., NEW YORK 57, N.Y.

LATE TYPE MACHINES

3'-9" American "Hole Wizard" Radial
10"x48" Norton "C" Plain Grinder
#70-A Heald Internal Grinder
Model 2-H Micromatic Hydrohoner
#3H Milwaukee Plain Miller
#3MS Cincinnati Miller
8"x48" #6L Thr/od Grinder

HAZARD BROWNELL MACHINE TOOLS INC.
350 Waterman St., Providence, R. I.

Be smart about your business . . . demand uniforms of

REEVES QUALITY FABRICS

Beyond compare for smart good looks and longer wear, Reeves Fabrics have what it takes to stand up under the punishment of repeated launderings . . . and still look fresh and crisp. For these Reeves Fabrics are made from carefully selected long-staple cotton . . . combed . . . Sanforized* . . . and vat-dyed in colors that are fast to sun, water and perspiration.

You benefit three ways. Smart looking uniforms boost employee morale . . . increase customer good will. Longer-wearing uniforms mean greater savings because they spread first costs.

Look for the Reeves Fabric Label — it's your sign of uniforms and work clothes that "mean business." Write today for complete information concerning your industry.

*Residual shrinkage less than 1%

"FROM COTTON TO CUTTER"

REEVES BROTHERS, INC.

54 WORTH STREET, NEW YORK 13, N. Y.

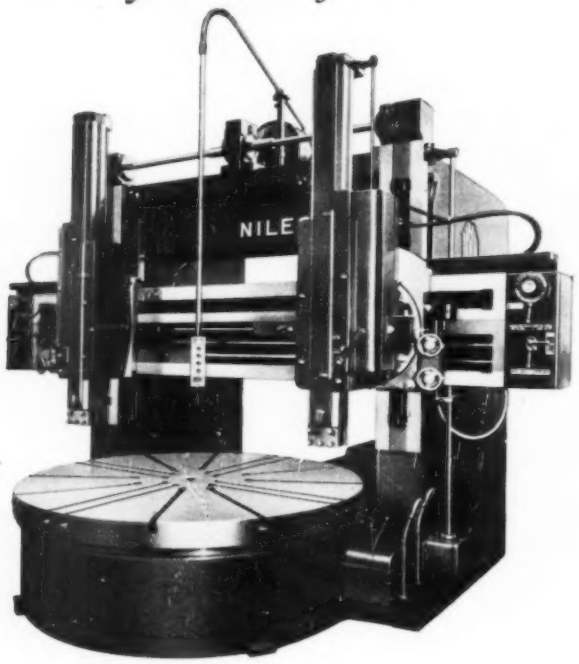
REPRESENTATIVES IN: *Akron • Atlanta • Boston • Chicago • Dallas • Los Angeles • Philadelphia • Portland, Oregon • St. Louis • Montreal • Toronto*

INDEX OF PRODUCTS ADVERTISED IN THIS ISSUE

Abrasives.....28-29, 132, 222, 230, 243
Accessories & Attachments (Machine Tool)..59, 61, 68, 170, 199, 233, 234, 235
Arbors & Mandrels.....208
Bearings.....4th Cover, 176, 202, 204, 243
Books, Technical..219, 222, 228, 233, 235, 237, 241, 245
Boring, Drilling & Milling Machines (Horizontal).....8-9, 160
Boring Machines, Internal.....157
Boring & Turning Machines (Vertical).....65, 260
Broaching Machines.....48, 149, 213
Brushes 264
Centrifugals 230
Chucks 238
Cleaning & Drying Machines & Supplies.....206
Counters 17
Coolant Systems, Filters & Supplies.....57, 168
Cut-Off Machines; Sawing Machines..187, 222, 234, 236
Dressers, Grinding Wheel.....225
Drilling Machines....66, 69, 74, 145, 173, 184, 244, 262
Duplicators & Pantographs.....24-25
Dust Collectors 165
Electrical Parts & Equipment..40-41, 46, 155, 170, 211
Engineering & Production Services....239
Fabricating Methods & Services.....128
Fasteners..139, 163, 169, 174, 181, 183, 188, 210, 216
Forgings 246
Gages & Instruments..26, 53, 58, 158, 172, 174, 193, 209, 222, 234, 239, 242, 244
Gear Cutting Machines..3, 6-7, 24-25, 164, 166, 232
Gears, Speed Reducers, Motor Reducers 23, 175, 177, 185, 186, 187
Gear Testers.....3, 6-7
Grinders—Cutter & Tool....4-5, 24-25, 188, 219, 222, 225
Grinding Machines—Production.....2nd Cover, 4-5, 12-13, 18-19, 24-25, 62, 153, 196, 236, 240
Heads: Drilling, Grinding & Tapping..242
Heat Treating Equipment & Supplies..244
Hydraulic & Pneumatic Parts & Equipment.....57, 177, 215, 224
Jig Borers.....24-25, 225
Lathes, Automatic.....27, 50, 52, 192
Lathes, Engine.....20-21, 22, 24-25, 52, 55, 56, 147, 192, 201, 231, 238, 246
Lathes, Turret.....35, 42
Lubricants, Cutting Fluids, Quenching Oils, Rust Preventives.....43, 44, 45, 130, 171, 189, 194, 204, 212, 219, 235
Lubricating Systems & Equipment....205
Marking Machines & Tools...226, 244, 246
Materials, Cutting & Forming.....14-15, 167, 223
Materials of Manufacture....67, 141, 154, 159, 161, 164, 203, 217, 218, 237
Materials Handling Equipment.....151, 156, 191, 221
Mechanical Parts & Equipment.....70, 238, 239
Millers, Die Sinkers, Profilers.....24-25, 38-39, 182, 209, 228, 231, 238, 240
Planers 60, 207
Polishing & Buffing Machines.....236
Power Transmission.....16, 70, 197, 227
Presses, Forging & Forming Equipment & Supplies.....30-31, 36-37, 47, 63, 76, 160, 180, 186, 198, 214, 225, 229, 240, 243, 244, 246
Production, Inventory & Tool Control..162
Riveting Machines.....246
Safety & Welfare Equipment.....51, 232
Screw Machines; Chucking Machines.....3rd Cover, 35, 49, 54, 224, 231
Shapers, Slotters, Keyseaters.....24-25, 207, 238, 240
Shop Furniture.....241
Special Machine Tools.....177, 233
Spindles, Machine.....190
Stampings.....240, 246
Tapping Machines.....74, 184
Textiles 258
Threading Machines.....10-11, 24-25
Tooling Set-Up Equipment.....241
Tools, Cutting.....24-25, 32, 33, 34, 64, 68, 125, 126, 149, 167, 178, 179, 199, 200, 213, 220, 223, 240, 243
Tools, Portable.....24-25, 195, 234
Welding & Cutting, Brazing & Soldering Equipment & Supplies....143

You'll get more production – ACCURATELY

with Tungsten-Carbide tools and Hydraulic feed



With rigidity to spare, this Niles Hydraulic Vertical Boring Mill can take the stress of cutting at high surface speeds with Tungsten-Carbide Tools – yet still produce accurately.

With fingertip control, the Hydraulic Feed boosts production by speeding tool placement and reducing operator's fatigue.

* * *

Niles Hydraulic Vertical Boring Mills are built in all standard sizes from 72 inches up. Vertical Boring Mills with mechanical feed can be supplied from 100 inches up. For further information, call the Lima-Hamilton sales offices in New York or Chicago or write directly to Lima-Hamilton Corporation, Hamilton, Ohio.

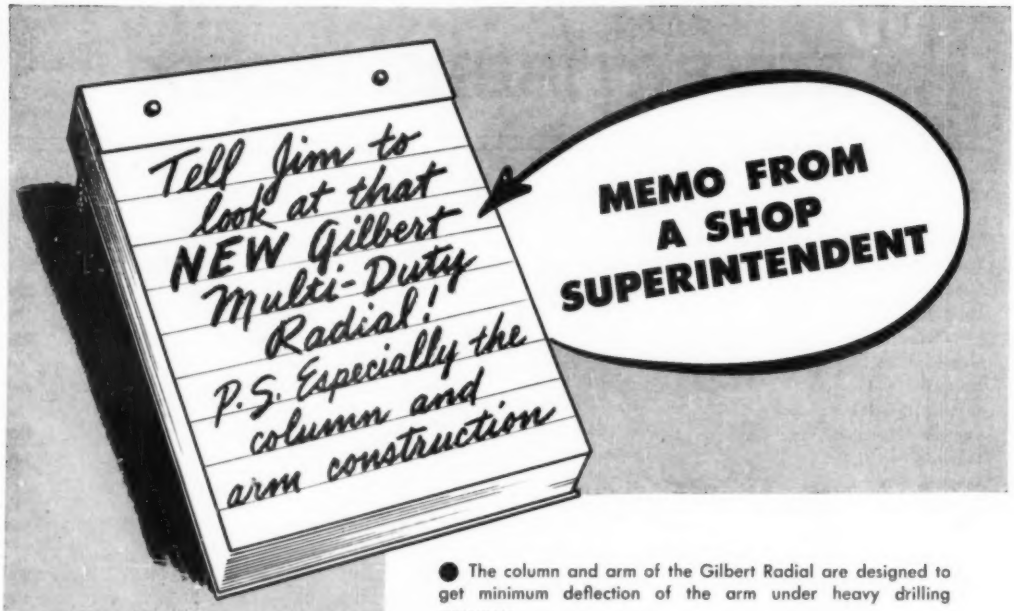
LIMA HAMILTON CORPORATION

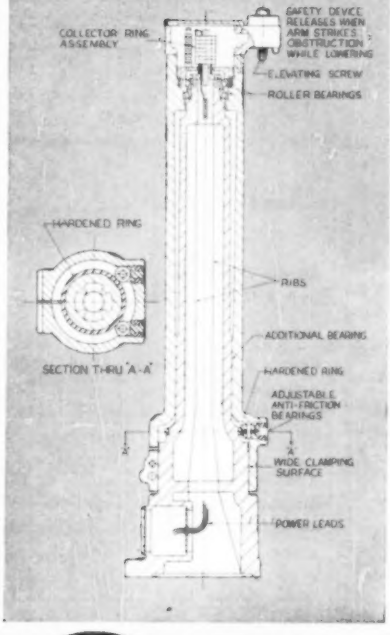
DIVISIONS: *Hamilton, Ohio* – Niles Tool Works Co.; Hooven, Owens, Rentschler Co. *Lima, Ohio* – Lima Locomotive Works, Inc.; Lima Shovel and Crane Division. *Middletown, Ohio* – United Welding Co.

PRINCIPAL PRODUCTS: Niles heavy machine tools, Hamilton diesel and steam engines, Hamilton heavy metal stamping presses, Hamilton-Kruse automatic can-making machinery, Locomotives, Shovels and cranes, Special heavy machinery, Heavy iron castings, Weldments.

ADVERTISERS INDEX

	Page
Abrasive Machine Tool Co.	240
Acromark Co.	246
Alemite	205
Allied Research Products, Inc.	164
Allis-Chalmers Mfg. Co.	46
Alox Corp.	235
American Air Filter Co.	165
American Broach & Machine Co.	43
American Magnesium Corp.	67
American Optical Co.	51
American Screw Co.	139
American Steel Foundries Division King Machine Tool Co.	65
American Tool Works	20-21
Ames Co., B. C.	158
Amgears, Incorporated	177
Angier Corporation	171
Armstrong-Blum Mfg. Co.	64
Armstrong Bros. Tool Co.	63
Atlantic Steel Co.	246
Axelson Mfg. Co.	261
Ball & Roller Bearing Co.	243
Barber-Colman Co.	32
Barrett Co., Leon J.	230
Baumbach Mfg. Co., E. A.	245
Bellows Co.	215
Bilgram Gear & Machine Co.	187
Birdsboro Steel Foundry & Machine Co.	229
Black & Decker Mfg. Co.	195
Blanchard Machine Co.	62
Bliss Co., E. W.	30-31
Boston Woven Hose & Rubber Co.	197
Brown & Sharpe Mfg. Co.	53, 57
Bryant Machinery & Engineering Co.	55
Bullard Co.	59
Carborundum Co.	28-29
Carlton Machine Tool Co.	244
Carpenter Steel Co.	14-15
Cincool Division, Cincinnati Milling Machine Co.	45
Cincinnati Bickford Tool Co.	69
Cincinnati Electrical Tool Co.	236
Cincinnati Gear Co.	187
Cincinnati Gilbert Machine Tool Co.	262
Cincinnati Grinders, Incorporated	5
Cincinnati Lathe & Tool Co.	56
Cincinnati Milling Machine Co.	4
Cincinnati Shaper Co.	76
Clark Industrial Truck Div., Clark Equipment Co.	151
Cleveland Twist Drill Co.	126
Colonial Broach Co.	149
Columbus Die Tool & Machine Co.	239
Cone Automatic Machine Co.	54
Consolidated Machine Tool Corp.	61
Continental Screw Co.	169
Cross Co.	164
Curtis Universal Joint Co.	239
Danly Machine Specialties, Inc.	47, 63
Davis & Thompson Co.	228
Davis Keyseater Co.	249
Dayton Rogers Mfg. Co.	249
Dearborn Gage Co.	209
Derbyshire, Inc., F. W.	246
Detroit Die Set Corp.	186
Detroit Power Screwdriver Co.	238
Diamond Machine Tool Co.	244
DoAll Co.	193
Dumore Co.	234
Eagle Picher Sales Co.	232
Eastern Machine Screw Corp.	243
Eastman Kodak Co.	242
Eaton Mfg. Co., Reliance Spring Washer Div.	216
Elgin National Watch Co., Industrial Products Div.	243
Etna Machine Co.	222
Ettco Tool Co.	242
Excello Corporation	157
Fellows Gear Shaper Co.	6-7
Firth Sterling Steel & Carbide Corp.	167
Fosdick Machine Tool Co.	66
Gairing Tool Co.	174
Gallmeyer & Livingston Co.	153
Ganschow Gear Co.	187
Gates Rubber Co.	227
Gear Specialties	23
General Electric Co., Apparatus Dept.	170
Geometric Tool Co.	34
Gisholt Machine Co.	42
Gleason Works	3
Goss & deLeeuw Machine Co.	224
Grant Gear Works	186
Grant Mfg. & Machine Co.	246
Gray Co., G. A.	60
Greaves Machine Tool Co.	240
Greenfield Tap & Die Corp.	33
Grob Brothers	187
Gulf Oil Corp.	189
Hamilton Tool Co.	166
Hannifin Corp.	224
Hardinge Brothers, Inc.	231
Harper Co., H. M.	163
Hartford Special Machinery Co.	233
Haynes Stellite Co.	223
Heald Machine Co.	2nd Cover
Hones, Inc., Charles A.	244
Houghton & Co., E. F.	194
Hunt Spiller Manufacturing Co.	159
Hyatt Bearings Div., Gen. Motors Corp.	202
Industrial Carbide Tool Co.	178
Johnson Bronze Co.	176
Jones & Lamson Machine Co.	50
Kearney & Trecker Corp.	38-39
Kennametal, Inc.	220
Kent-Owens Machine Co.	182
King Machine Tool	65
Kingsbury Machine Tool Corp.	184
Korfund Co., Inc.	209
Landis Machine Co.	10-11
Landis Tool Co.	12-13
LaPointe Machine Tool Co.	213
La Salle Co.	217
LeBlond Machine Tool Co., R. K.	52
Lees-Bradner Co.	232
Leland-Gifford Co.	145
Lewthwaite Machine Co., T. H.	234
Lima-Hamilton Corp.	260
Lincoln Electric Co.	143


Tell Jim to look at that NEW Gilbert Multi-Duty Radial! P.S. Especially the column and arm construction
MEMO FROM A SHOP SUPERINTENDENT

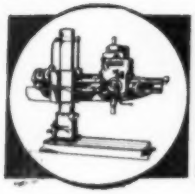


● The column and arm of the Gilbert Radial are designed to get minimum deflection of the arm under heavy drilling pressures.

The column is of proven two piece construction of exceptionally rigid design. The outer column has three bearings on the inner column; two opposed taper roller bearings at the top, two adjustable ball bearings at the bottom rolling on a hardened steel ring, *plus* a third long sleeve bearing. The adjustable lower bearings assure rigid clamping and easy swinging of the arm.

The arm, illustrated below, is of double box section construction with no cored holes on the front or back face. The arm has a long bearing on the column (20½" on the 9" column machine and 23¾" on the 11" machine). Tortional moment is at a minimum because the center of the spindle is only 2½" from the face of the arm.

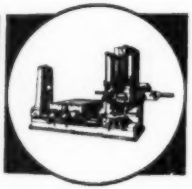
Thus the Multi-Duty Radial provides all the essentials of rigid construction and proved design that result in easy operation, dependable and accurate production. *Bulletin available.*



THE CINCINNATI GILBERT MACHINE TOOL CO.

3360 BEEKMAN ST. • CINCINNATI 23, OHIO

RADIAL DRILLS . . . HORIZONTAL BORING MILLS



ADVERTISERS INDEX

	Page
Link-Belt Co.	16
Littell Machine Co., F. J.	243
Lodge & Shipley Co.	22
Lovejoy Tool Co., Inc.	179
Luers, J. Milton	187
Mahon Co., R. C.	128
Mallory & Co., Inc., P. R.	218
Marsh Stencil Machine Co.	246
McCaskey Register Co.	162
McCrosky Tool Corp.	243
McGraw-Hill Book Co., Inc.	219, 222, 228, 233, 235, 237, 241, 245
Mead Specialties Co.	177
Meisel Press Mfg. Co.	187
Metal Carbides Corp.	214
Modern Tool Works	61
Moline Tool Co.	160
Monarch Machine Tool Co.	147
Moore Special Tool Co., Inc.	225
Morris Machine Tool Co.	74
Morton Machine Works	234
Motch & Merryweather Machinery Co.	200
Murchey Machine & Tool Co.	125
National Acme Co.	49
National Machine Tool Co.	240
Newark Gear Cutting Machine Co.	187
New Britain Gridley Machine Co.	3rd Cover
Niagara Machine & Tool Works	36-37
Noble & Westbrook Mfg. Co.	226
Norma-Hoffmann Bearings Co.	204
Norton Co.	18-19
Oakite Products, Inc.	206
Oliver Instrument Co.	188
Parker-Kalon Corp.	210
Parker Rust Proof Co.	212
Perkins Machine & Gear Co.	175
Philadelphia Gear Works	185
Pittsburgh Plate Glass Co., Brush Div.	264
Pope Machinery Co.	190
Potter & Johnston Co., Sub., Pratt & Whitney Div., Niles-Bement-Pond Co.	27
Pratt & Whitney Div., Niles-Bement-Pond Co.	24-25
Prosser & Son, Thomas	219
Reeves Bros., Inc.	258
Reeves Pulley Co.	70
Republic Steel Corp.	203
Revere Copper & Brass, Inc.	141
Reynolds Metals Co., Aluminum Div.	161
Robertson Mfg. Co.	230
Rockford Machine Tool Co.	207
Ruthman Machinery Co.	168
Ryerson & Sons, Inc., Joseph T.	154
Sales Service Machine Tool Co.	160
Scherr Co., Inc., George	234
Schmidt, Inc., George T.	244
Scully Jones & Co.	208
Seneca Falls Machine Co.	192
Sheldon Machine Co.	238
Shore Instrument & Mfg. Co., Inc.	222
Sibley Machine & Foundry Corp.	173
Simonds Abrasive Co.	132
Skinner Chuck Co.	241
Smith Corp., A. O.	211
Springfield Machine Tool Co.	55
Square D Co.	155
Standard Conveyor Co.	156
Standard Oil Co. (Indiana)	43, 44
Stewart Warner Corp.	205
Strong, Carlisle & Hammond Co.	188
Stuart Oil Co., D. A.	219
Sun Oil Co.	130
Swedish Gage Co. of America	244
Swiss American Jewel Bearings Co.	243
Taft-Peirce Mfg. Co.	58
Thompson Grinder Co.	196
Timesaver Products, Inc.	222
Timken Roller Bearing Co.	4th Cover
Townsend Company	181
Union Carbide & Carbon Corp.	223
United States Steel Corp.	237
U. S. Steel Supply Co.	237
V & O Press Co.	246
Van Keuren Co.	26
Van Norman Co.	8-9
Veeder-Root, Inc.	17
Verson Allsteel Press Co.	198
Waldes Koh-I-Noor, Inc.	183
Waltham Machine Works	240
Warner & Swasey Co.	35
Wayne Pump Co.	221
Webber Gage Co.	172
Westinghouse Electric Corp.	40-41
Whistler & Sons, S. B.	180
Whiton Machine Co.	238
Willeys Carbide Tool Co.	222
Williams & Co., J. H.	199
Wilson Mechanical Instrument Co.	239
Wittek Manufacturing Co.	170
Woodworth Co., N. A.	235
Yale & Towne Manufacturing Co.	191
Zeh & Hahnemann Co.	246

SEARCHLIGHT SECTION
(Classified Advertising)

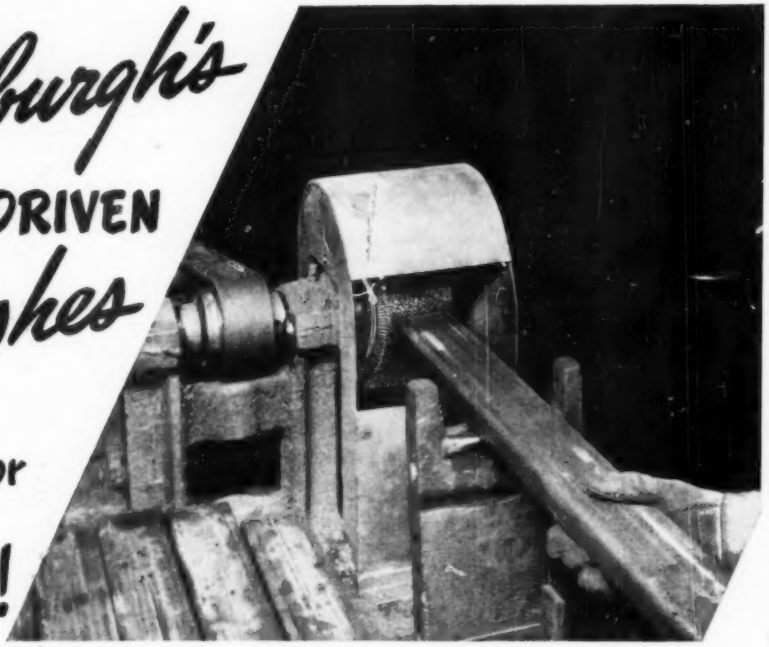
EMPLOYMENT	Page
Positions Vacant	247
Selling Opportunities Offered	247
Positions Wanted	247
SPECIAL SERVICES	
Contract Work	247
General Pattern Works	247
Dennison Machine Tool Co., Inc.	247
EQUIPMENT (Used or Surplus New) For Sale	248-257
WANTED Equipment	247

ADVERTISERS INDEX

Aaron Machinery Co.	251
Bennett Machinery Co.	257
Botwinik Bros., Inc.	254
Botwinik Bros. of Mass., Inc.	250
Brooks Inc., B. D.	250
Brownell, Hazard Machine Tools, Inc.	257
Capitol Machinery Corp.	252
Continental Salvage & Machinery Corp.	257
Dony Machinery Co. D. E.	256
Eastern Machinery Corp.	248
Emerman Machinery Corp.	256
Falk Machinery Co.	249
Harrison Machinery Exchange, Inc.	256
Hill-Clarke Machinery Co.	253
Hyman & Son, Joseph	257
Indianapolis Machy. & Supply Co.	250
Kings County Machy. Exchange	257
McIlvanie Machine Works	256
Miles Machinery Co.	254
Mitchell Machine	250
Morey Machinery Co.	255
National Machy. Exchange	254
O'Connell Machy. Co.	252
Osborne & Sexton Machy. Co.	248
Paul's Machinery Co.	248
Sier-Bath Gear & Pump Co.	257
Simmons Machine Tool Co.	257
Standard Radio Electrical Products	257
Tri-Machine & Tool Co., Inc.	250
Victor Machinery Exchange	248
West Penn Machinery Co.	256
Wigglesworth Machinery Co.	254
Winston Machinery Co., Inc.	248

Pittsburgh's POWER DRIVEN Brushes

on the job for NATIONAL ELECTRIC!



A Pittsburgh "power-driven" brush in operation at the Ambridge plant of the National Electric Products Corporation. Removing burrs, this special brush is on the job every day.

● Like many other leading industries, National Electric put their brushing problems before Pittsburgh's skilled brush engineers. Then Pittsburgh went to work to design and build a special brush for this rough assignment. The brush had to be *stiff* enough to remove burrs and scales. It had to be *tough* enough to penetrate and thoroughly clean the metal. And it had to be *rugged* enough to withstand heavy operation at high speed.

● You, too, can always depend on Pittsburgh to solve your brush problems. Its well-staffed crew of skilled engineers can solve your brush troubles quickly and effectively.

There's a Pittsburgh Brush for Every Industrial Use!

- GLASS
- STEEL
- PLASTICS
- AUTOMOBILE
- RUBBER
- PAPER
- TIRE and RETREADING
- SHOE MANUFACTURING and REPAIRING

In the complete Pittsburgh line are brushes of all types, including "Perfect Balance" sections, wheels and assemblies. Consult the Pittsburgh engineering representative. He will gladly work with you in developing any type of power-driven brushes to meet your particular finishing specifications. Write or phone Pittsburgh Plate Glass Company, 3221 Frederick Avenue, Baltimore—29, Md.

Power Driven BRUSHES

BRUSHES · PAINT · GLASS · CHEMICALS · PLASTICS

PITTSBURGH PLATE GLASS COMPANY

DIVIDEND NOTICE

The directors of your manufacturing company announce the regular quarterly dividend of 10% payable to stockholders of record . . .

Model 601 Model 86 Model 37 Model 65

40% annual return on an investment in New Britain Automatics is commonplace

REPLACEMENT of old machines (even those in good working condition) with New Britain modern automatics frequently shows this or greater return on the basis of direct labor savings alone . . . with substantial extra dividends in overhead, recovery on equipment replaced and other factors.

The peculiar fact about modern machine tools as an investment is that the person who fails to make the investment is the one who runs the risk, because he endangers his ability to compete successfully.

Have you examined your equipment from this viewpoint recently? It's a simple process. Your New Britain representative with the help of our Estimating Department is available to assist you in analyzing your own machine replacement program.

We know you would benefit by having a talk with any one of the following sales engineers. Write, wire or call collect:

Mr. C. W. Coffin
Mr. W. H. Nettin
New Britain-Gridley Mach. Div.
3-212 General Motors Building
Detroit, Michigan

Mr. Welles Eddy
New Britain-Gridley Mach. Div.
South Street
New Britain, Connecticut

Mr. F. H. Hastings
1853 Bluefield Place
Cincinnati 16, Ohio

Mr. R. E. Clark
Hotel New Yorker
New York, New York

Mr. J. J. Barry
3210 Thayer Street
Evanston, Illinois

Mr. J. E. Sullivan
14820 Wake Avenue
San Leandro, Calif.

Mr. Malcolm Roberts
3601 Traver Road
Shaker Heights, Ohio

Preston Machine Tool Sales Company
3016 Canal St.,
Houston, Texas

THE NEW BRITAIN MACHINE CO. NB

NEW BRITAIN *Automatics*

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN-GRIDLEY MACHINE DIVISION
NEW BRITAIN, CONNECTICUT

649IA1

How TIMKEN® bearings keep a shaper in shape

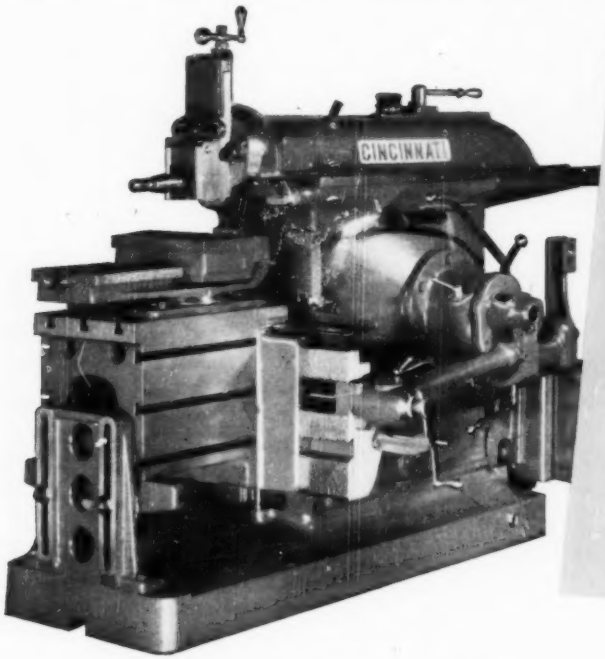
THE outstanding features of this Cincinnati 24" Universal Shaper include built-in rapid traverse to the table feed, completely enclosed transmission, and location of controls within easy reach of the normal operating position. And, of course, Timken® bearings are included on the pulley shaft, power rapid traverse shaft, and on the cross-feed screws to assure maximum precision and long, trouble-free service.

Timken tapered roller bearings keep shafts in rigid alignment under the heaviest loads. Lubrication is simplified and power loss is reduced to a minimum.

Due to the tapered construction of Timken bearings, they carry any combination of radial and thrust loads. Manufactured to extreme precision and finished to incredible smoothness, Timken roller bearings make friction practically negligible. Full line contact between rolls and races permit maximum load carrying capacity. And since they're made of the finest steel ever developed for tapered roller bearings—Timken fine alloy steel—they last the life of the machine.

With a background of almost fifty years of bearing research and development, Timken tapered roller bearings are first choice throughout all industry. No other bearing can bring you *all* the advantages you get with Timken bearings. Look for the trade-mark "Timken" on every bearing you use. The Timken Roller Bearing Company, Canton 6, O. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.



This **CINCINNATI** *24" universal shaper relies on Timken bearings on pulley shaft, power rapid traverse shaft and cross feed screws for precision and trouble-free operation.*

NEW TIMKEN BEARING CUTS RUN-OUT IN HALF!

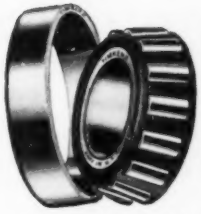
Until now, the Timken "Zero" bearing has been the last word in bearing accuracy. Now Timken offers industry the "Double-Zero" bearing—*twice as accurate* as the "Zero"! Maximum run-out of the new "Double-Zero" bearing is only 75 millionths of an inch—*half* the 150 millionths run out of the "Zero" bearing.

What an opportunity for manufacturers of machines where extreme accuracy is essential! Available in standard single row types, up to 10" O.D. Write for further information.

TIMKEN

TRADE MARK REG. U.S. PAT. OFF.

TAPERED ROLLER BEARINGS



NOT JUST A BALL ◯ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◫ AND THRUST ◫ LOADS OR ANY COMBINATION ◫